



Quality of Service Commands

This module lists quality of service (QoS) commands in alphabetical order.

To use commands of this module, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using any command, contact your AAA administrator for assistance.

For detailed information about QoS concepts, configuration tasks, and examples, see the *Modular QoS Configuration Guide for Cisco NCS 6000 Series Routers* and *Modular Quality of Service Configuration Guide for Cisco NCS 6000 Series Routers*.

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bandwidth (QoS)

To specify the minimum bandwidth allocated to a class belonging to a policy map, use the **bandwidth** command in policy map class configuration mode. To remove the bandwidth specified for a class, use the **no** form of this command.

```
bandwidth {rate [units] | percent percentage-value}
no bandwidth {rate [units] | percent percentage-value}
```

Syntax Description	<i>rate</i>	Minimum bandwidth, in the units specified, to be assigned to the class. Range is from 1 to 4294967295.
	<i>units</i>	Specifies the units for the bandwidth. Values can be: <ul style="list-style-type: none"> • bps—bits per second • gbps—gigabits per second • kbps—kilobits per second (default) • mbps—megabits per second
	percent <i>percentage-value</i>	Specifies the amount of guaranteed bandwidth, based on an absolute percentage of available bandwidth. Range is from 1 to 100.

Command Default The default units is kbps.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The **bandwidth** command is used to specify the minimum guaranteed bandwidth allocated for traffic matching a particular class. Bandwidth may be defined as a specific value or may be set as a percentage of the interface bandwidth.

If a percentage value is set, the accuracy that can be expected is 1 percent.

In the hierarchical policing, lower limit for shape or minimum bandwidth is 4,688 Kbps on 100GE interface and 2,798 Kbps on 10GE interface at topmost level and 19 kbps on 100 GE interface and 11 kbps on 10 GE interface for below topmost level respectively.



Note The bandwidth value takes into account the Layer 2 encapsulation that is applied to traffic leaving the interface. For , the encapsulation is considered to be 14 bytes; whereas for IEEE 802.1Q, the encapsulation is 18 bytes. The actual bandwidth assigned to a class can be seen in the output of the **show qos interface** command.

Be careful when specifying bandwidth guarantees close to 100 percent, because the Layer 2 encapsulation considered does not include the entire Layer 2 header. This can lead to oversubscription, particularly in the case of small packet sizes.

A policy map can have a single bandwidth statement per class. Both percentage and actual value bandwidth configurations can be used within a policy map.

The **bandwidth** command does not specify how the bandwidth is to be shared. Instead it specifies how much bandwidth is guaranteed per class, by setting the number of tokens that are assigned to the token bucket of a particular class. For configured behavior to work correctly, you must ensure that the sum of the bandwidths plus any priority traffic is not greater than the bandwidth of the interface itself. If the interface is oversubscribed, unpredictable behavior results.

The bandwidth of the interface is set to be that of the physical interface, unless a hierarchical policy is defined that reduces the bandwidth available to the traffic. The following example shows a hierarchical policy being used to shape traffic to the specified value. The child policy then determines how the shaped bandwidth should be apportioned between the specified classes:

```

policy-map parent
  class match_all
    shape average 1000000
    bandwidth 1000000
    service-policy child

policy-map child
  class gold
    bandwidth percent 20
  class silver
    bandwidth percent 40
  class default
    bandwidth percent 40

```



Note The **bandwidth** command is part of the parent policy. In this instance, the **bandwidth** command not only sets the minimum bandwidth for the class but also resets the reference point for the **bandwidth percent** statements in the child policy.

- If bandwidth is configured in the parent class, parent minimum bandwidth is used as a reference for the child bandwidth percentages.
- If bandwidth is not configured in the parent class, the implicit minimum bandwidth, which is a portion of the total unallocated bandwidth allocated to the class based on the explicit or implicit bandwidth remaining, is used as a reference.

For subinterface policies:

- If bandwidth is configured in the parent class, parent minimum bandwidth is used as a reference for child bandwidth percentages.
- If bandwidth remaining is configured in the parent class, *bandwidth-remaining-percent * interface-rate* is used as a reference.
- If bandwidth is not configured in the parent class, *shape rate* is used as a reference.

In this example, the hierarchical policy is attached to the main interface, and the parent classes are a mix of bandwidth and shape only classes:

```

policy-map hqos
  class c1
    bandwidth percent 40
    service-policy child
  class c2
    shape average 500000000
    service-policy child

```

The reference for the child policy in class c2 is the implicit bandwidth of class c2 bounded by the shape rate of class c2. Therefore, the reference = (60 percent * interface bandwidth) / 3 bounded by 500000000 kbps.

In this example, the hierarchical policy is a class-default only parent shape configured on subinterfaces:

```

policy-map sub_int_hqos
  class class-default
    shape average 40
    service-policy child

```

The class-default parent shape rate is used as reference.

When the **percent** keyword is used with the **bandwidth** command, the bandwidth of the interface is defined as being the Layer 2 capacity excluding the Gigabit Ethernet but including the High-Level Data Link Control (HDLC) flags, frame check sequence (FCS), and so on. These have to be included because they are applied per packet, and the system cannot predict how many packets of a particular packet size are being sent out.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to guarantee 50 percent of the interface bandwidth to a class called class1 and 10 percent of the interface bandwidth to a class called class2:

```

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth percent 50
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# class class2
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth percent 10

```

bandwidth remaining

To specify how to allocate leftover bandwidth to various classes, use the **bandwidth remaining** command in policy map class configuration mode. To return to the system defaults, use the **no** form of this command.

Syntax Description	percent <i>percentage-value</i> Specifies the amount of guaranteed bandwidth, based on an absolute percentage of the available bandwidth. Range is from 1 to 100.
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Command Default	No bandwidth is specified.
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Command Modes	Policy map class configuration
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Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The **bandwidth remaining** command is used to set the Modified Deficit Round Robin (MDRR) weight for the particular class.

When applied within an egress service policy, the command is used to define how any unallocated bandwidth should be apportioned. In such a combination, if the minimum bandwidth guarantees are met, the remaining bandwidth is shared in the ratio defined by the **bandwidth remaining** command in the class configuration in the policy map.

The available bandwidth is equally distributed among those queueing classes that do not have the remaining bandwidth explicitly configured.



Note On egress, the actual bandwidth of the interface is determined to be the Layer 2 capacity. These have to be included because they are applied per packet, and the system cannot predict how many packets of a particular packet size are being sent out.

On egress, if the **bandwidth remaining** command is not present, then the bandwidth is shared equally among the configured queueing classes present in the policy-map. When attempting precise calculations of expected MDRR behavior, you must bear in mind that because you are dealing with the bandwidth remaining on the link, you must convert the values to the bandwidth remaining percentages on the link, based upon the packet sizes of the traffic within the class. If the packet sizes are the same in all the classes, then the defined ratio is enforced precisely and predictably on the link.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how the remaining bandwidth is shared by classes class1 and class2 in a 20:80 ratio.

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth remaining percent 20
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# class class2
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth remaining percent 80
```

class (policy-map)

To specify the name of the class whose policy you want to create or change, use the **class** command in policy map configuration mode. To remove a class from the policy map, use the **no** form of this command.

```
class [type qos] {class-name | class-default}
no class [type qos] {class-name | class-default}
```

Syntax Description

type qos	(Optional) Specifies a quality-of-service (QoS) class.
<i>class-name</i>	Name of the class for which you want to configure or modify policy.
class-default	Configures the default class.

Command Default

No class is specified.
Type is QoS when not specified.

Command Modes

Policy map configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

Within a policy map, the **class (policy-map)** command can be used to specify the name of the class whose policy you want to create or change. The policy map must be identified first.

To identify the policy map (and enter the required policy map configuration mode), use the **policy-map** command before you use the **class (policy-map)** command. After you specify a policy map, you can configure the policy for new classes or modify the policy for any existing classes in that policy map.

Usage Guidelines

The class name that you specify in the policy map ties the characteristics for that class—that is, its policy—to the class map and its match criteria, as configured using the **class-map** command.

The **class-default** keyword is used for configuring default classes. It is a reserved name and cannot be used with user-defined classes. It is always added to the policy map (type qos) even if the class is not configured. For example, the following configuration shows that the class has not been configured, but the running configuration shows ‘class class-default’.

```
RP/0/RP0/CPU0:router(config)# policy-map pm1
RP/0/RP0/CPU0:router(config-pmap)# end-policy-map
RP/0/RP0/CPU0:router(config)# end
!
RP/0/RP0/CPU0:router# show running-config
!
policy-map pm1
  class class-default
  !
end-policy-map
!
```

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to create a policy map called policy1, which is defined to shape class1 traffic at 30 percent and default class traffic at 20 percent.

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match precedence 3
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# shape average percent 30
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# class class-default
RP/0/RP0/CPU0:router(config-pmap-c)# shape average percent 20
```

The default class is used for packets that do not satisfy configured match criteria for class1. Class1 must be defined before it can be used in policy1, but the default class can be directly used in a policy map, as the system defines it implicitly.

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.

class-map

To define a traffic class and the associated rules that match packets to the class, use the **class-map** command in XR Config mode. To remove an existing class map from the router, use the **no** form of this command.

```
class-map [type [traffic | qos]] [match-all] [match-any] class-map-name
no class-map [type [traffic | qos]] [match-all] [match-any] class-map-name
```

Syntax Description

type qos	(Optional) Specifies a quality-of-service (QoS) class-map.
traffic	(Optional) Specifies traffic type class-map.
match-all	(Optional) Specifies a match on all of the match criteria.
match-any	(Optional) Specifies a match on any of the match criteria. This is the default.
<i>class-map-name</i>	Name of the class for the class map. The class name is used for the class map and to configure policy for the class in the policy map. The class name can be a maximum of 63 characters, must start with an alphanumeric character, and in addition to alphanumeric characters, can contain any of the following characters: . _ @ \$ % + # : ; - =

Command Default

Type is QoS when not specified.

Command Modes

XR Config mode

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

The **class-map** command specifies the name of the class for which you want to create or modify class map match criteria. Use of this command enables class map configuration mode in which you can enter any **match** command to configure the match criteria for this class. Packets arriving on the interface are checked against the match criteria configured for a class map to determine if the packet belongs to that class.

These commands can be used in a class map:

- **match access-group**
- **match [not] cos**
- **match destination-address**
- **match [not] discard-class**
- **match [not] dscp**
- **match [not] mpls experimental topmost**
- **match [not] precedence**
- **match precedence**
- **match [not] protocol**
- **match [not] qos-group**
- **match source-address**
- **match vlan** *vlan-id*

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to specify class101 as the name of a class and defines a class map for this class. The packets that match the access list 101 are matched to class class101.

```
RP/0/RP0/CPU0:router(config)# class-map class101
RP/0/RP0/CPU0:router(config-cmap)# match access-group ipv4 101
```

Related Commands	Command	Description
	class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
	match access-group, on page 19	Identifies a specified access control list (ACL) number as the match criteria for a class map.
	match cos, on page 21	Identifies specified class of service (CoS) values as a match criteria in a class map.
	match destination-address, on page 23	Identifies a specific destination MAC address explicitly as a match criterion in a class map.
	match discard-class, on page 25	Identifies specific discard class values as a match criteria for a class map.
	match dscp, on page 27	Identifies specific IP differentiated services code point (DSCP) values as match criteria for a class map.
	match mpls experimental topmost, on page 30	Identifies specific three-bit experimental (EXP) field values in the topmost Multiprotocol Label Switching (MPLS) label as match criteria for a class map.
	match precedence, on page 32	Identifies IP precedence values as match criteria.
	match protocol, on page 35	Identifies a specific protocol as the match criterion for a class map.
	match qos-group, on page 37	Identifies specific quality-of-service (QoS) group values as match criteria in a class map.
	match source-address, on page 39	Identifies a specific source MAC address as match criterion in a class map.
	match vlan, on page 41	Identifies selected VLAN IDs as the match criteria for a class map.

clear qos counters interface

To clear QoS counters for a specified interface, use the **clear qos counters interface** command in EXEC mode.

```
clear qos counters interface type [{input | output}]
```

Syntax Description	<i>type</i> Interface type. For more information, use the question mark (?) online help function.
input	(Optional) Clears input QoS counters that are attached to the specified interface.
output	(Optional) Clears output QoS counters that are attached to the specified interface.

Command Default No default behavior or values

Command Modes EXEC

Command History

Usage Guidelines

To use this command, you must be in a user group associated with a task group that includes appropriate task IDs. If the user group assignment is preventing you from using a command, contact your AAA administrator for assistance.

The **clear qos counters interface** command clears all input and output QoS counters that are attached to a specified interface, unless the **input** or **output** keyword is specified. If the **input** or **output** keyword is specified, only counters attached to the interface in a specified direction are cleared.

The MIB counters are not reset with this command.

Task ID	Task ID	Operations
	qos	read, write

Examples

The following example shows how to clear QoS counters attached to Gigabit Ethernet interface 0/1/0/9:

```
RP/0/RP0/CPU0:router# clear qos counters interface gigabitethernet 0/1/0/9
```

The following example shows how to clear output QoS counters attached to POS interface 0/7/0/3:

```
RP/0/RP0/CPU0:router# clear qos counters interface pos 0/7/0/3 output
```

conform-action

To configure the action to take on packets that conform to the rate limit, use the **conform-action** command in policy map police configuration mode. To remove a conform action from the policy-map, use the **no** form of this command.

conform-action [{**drop** | **set** *options* | **transmit**}]

no conform-action [{**drop** | **set** *options* | **transmit**}]

Syntax Description	
drop	(Optional) Drops the packet.
set <i>options</i>	(Optional) Configures the specified packet properties. Replace <i>options</i> with one of the following keywords or keyword arguments: <ul style="list-style-type: none"> • cos value —Sets the class of service value. Range is 0 to 7. • discard-class value —Sets the discard class value. Range is 0 to 7. • dscp value —Sets the differentiated services code point (DSCP) value and sends the packet. See Table 1: IP DSCP Reserved Keywords, on page 28 for a list of valid values. • dscp [tunnel] value —Sets the differentiated services code point (DSCP) value and sends the packet. See Table 1: IP DSCP Reserved Keywords, on page 28 for a list of valid values. With the tunnel keyword, the DSCP is set in the outer header. • mpls experimental {topmost imposition} value —Sets the experimental (EXP) value of the Multiprotocol Label Switching (MPLS) packet topmost label or imposed label. Range is 0 to 7. • precedence precedence —Sets the IP precedence and sends the packet. See Table 2 for a list of valid values. • precedence [tunnel] precedence —Sets the IP precedence and sends the packet. See Table 2: IP Precedence Values and Names, on page 33 for a list of valid values. With the tunnel keyword, the precedence is set in the outer header. • qos-group value —Sets the QoS group value.
transmit	(Optional) Transmits the packets.

Command Default By default, if no action is configured on a packet that conforms to the rate limit, the packet is transmitted.

Command Modes Policy map police configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines For more information regarding the traffic policing feature, see the [police rate, on page 43](#) command.

The **conform-action** command is used to set the DSCP, the precedence, or the discard class for IP packets, and experimental or discard class values for MPLS packets.

Task ID	Task ID	Operations
	qos	read, write

Examples

In this example for MPLS, traffic policing is configured to set the MPLS experimental bit for packets that conform to the rate limit:

```
RP/0/RP0/CPU0:router(config)# class-map class
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 0
RP/0/RP0/CPU0:router(config-cmap)# exit

RP/0/RP0/CPU0:router(config)# policy-map child
RP/0/RP0/CPU0:router(config-pmap)# class precl
RP/0/RP0/CPU0:router(config-pmap-c)# police rate 100000000 peak-rate 3125000 peak-burst
3125000
RP/0/RP0/CPU0:router(config-pmap-c-police)# conform-action set mpls experimental imp 1
RP/0/RP0/CPU0:router(config-pmap-c-police)# conform-action set qos-group 1
RP/0/RP0/CPU0:router(config-pmap-c-police)# exit
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if) service-policy input policy1
```

Related Commands

Command	Description
exceed-action, on page 17	Configures the action to take on packets that exceed the rate limit.
police rate, on page 43	Configures traffic policing and enters policy map police configuration mode.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.
violate-action, on page 106	Configures the action to take on packets that violate the rate limit.

end-class-map

To end the configuration of match criteria for the class and to exit class map configuration mode, use the **end-class-map** command in class map configuration mode.

end-class-map

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values

Command Modes Class map configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines No specific guidelines impact the use of this command.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to end the class map configuration and exit class map configuration mode:

```
RP/0/RP0/CPU0:router(config)# class-map class101
RP/0/RP0/CPU0:router(config-cmap)# match access-group ipv4 101
RP/0/RP0/CPU0:router(config-cmap)# end-class-map
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.

end-policy-map

To end the configuration of a policy map and to exit policy map configuration mode, use the **end-policy-map** command in policy map configuration mode.

end-policy-map

Syntax Description	This command has no keywords or arguments.
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Command Default	No default behavior or values
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Command Modes	Policy map configuration
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Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines	No specific guidelines impact the use of this command.
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Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to end the policy map configuration and exit policy map configuration mode.

```
RP/0/RP0/CPU0:router (config) # policy-map policy1
RP/0/RP0/CPU0:router (config-pmap) # class class1
RP/0/RP0/CPU0:router (config-pmap-c) # police 250
RP/0/RP0/CPU0:router (config-pmap-c) # set precedence 3
RP/0/RP0/CPU0:router (config-pmap) # end-policy-map
```

Related Commands	Command	Description
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.

exceed-action

To configure the action to take on packets that exceed the rate limit, use the **exceed-action** command in policy map police configuration mode. To remove an exceed action from the policy-map, use the **no** form of this command.

```
exceed-action [{drop | set options | transmit}]
no exceed-action [{drop | set options | transmit}]
```

Syntax Description	<p>drop (Optional) Drops the packet.</p> <hr/> <p>set options Configures the specified packet properties. Replace <i>options</i> with one of the following keywords or keyword arguments:</p> <ul style="list-style-type: none"> • cos value —Sets the class of service value. Range is 0 to 7. • discard-class value —Sets the discard class value. Range is 0 to 7. • dscp value —Sets the differentiated services code point (DSCP) value and sends the packet. See Table 1: IP DSCP Reserved Keywords, on page 28 for a list of valid values. • dscp [tunnel] value —Sets the differentiated services code point (DSCP) value and sends the packet. See Table 1: IP DSCP Reserved Keywords, on page 28 for a list of valid values. With the tunnel keyword, the DSCP is set in the outer header. • fr-de value —Sets the Frame Relay discard eligible (DE) bit on the Frame Relay frame then transmits that packet. In congested environments, frames with the DE bit set to 1 are discarded before frames with the DE bit set to 0. The frame relay DE bit has only one bit and has only two settings, 0 or 1. The default DE bit setting is 0. • mpls experimental {topmost imposition} value —Sets the experimental (EXP) value of the Multiprotocol Label Switching (MPLS) packet topmost label or imposed label. Range is 0 to 7. • precedence precedence —Sets the IP precedence and sends the packet. See Table 2: IP Precedence Values and Names, on page 33 for a list of valid values. • precedence [tunnel] precedence —Sets the IP precedence and sends the packet. See Table 2: IP Precedence Values and Names, on page 33 for a list of valid values. With the tunnel keyword, the precedence is set in the outer header. • qos-group value —Sets the QoS group value. • qos-group value —Sets the QoS group value. Range is 0 to 511. <hr/> <p>transmit (Optional) Transmits the packets.</p>				
Command Default	By default, if no action is configured on a packet that exceeds the rate limit, the packet is dropped.				
Command Modes	Policy map police configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				
Usage Guidelines	For more information regarding the traffic policing feature, see the police rate, on page 43 command.				

The **exceed-action** command can be used to set the DSCP, the precedence, or the discard class for IP packets, and experimental or discard-class values for MPLS packets.

Task ID	Task ID	Operations
	qos	read, write

Examples

In this example for MPLS, traffic policing is configured to drop traffic that exceeds the rate limit:

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 0
RP/0/RP0/CPU0:router(config-cmap)# exit

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# police rate 250 kbps burst 50
RP/0/RP0/CPU0:router(config-pmap-c-police)# exceed-action drop
RP/0/RP0/CPU0:router(config-pmap-c-police)# exit
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if) service-policy input policy1
```

Related Commands	Command	Description
	conform-action, on page 13	Configures the action to take on packets that conform to the rate limit.
	police rate, on page 43	Configures traffic policing and enters policy map police configuration mode.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.
	violate-action, on page 106	Configures the action to take on packets that violate the rate limit.

match access-group

To identify a specified access control list (ACL) number as the match criteria for a class map, use the **match access-group** command in class map configuration mode. To remove ACL match criteria from a class map, use the **no** form of this command.

```
match [not] access-group {ipv4 | ipv6} access-group-name
no match [not] access-group {ipv4 | ipv6} access-group-name
```

Syntax Description	not	(Optional) Negates the specified match result.
	ipv4	Specifies the name of the IPv4 access group to be matched.
	ipv6	Specifies the name of the IPv6 access group to be matched.
	<i>access-group-name</i>	ACL whose contents are used as the match criteria against which packets are checked to determine if they belong to this class.
Command Default	By default, if neither IPv6 nor IPv4 is specified as the match criteria for a class map, IPv4 addressing is used.	
Command Modes	Class map configuration	
Command History	Release	Modification
	Release 5.0.0	This command was introduced.
Usage Guidelines	<p>For class-based features (such as marking, Modified Deficit Round Robin [MDRR], and policing), you define traffic classes based on match criteria, including ACLs and input interfaces. Packets satisfying the match criteria for a class constitute the traffic for that class.</p> <p>The match access-group command specifies an ACL whose contents are used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.</p> <p>Access Control Entries with TCP fields such as, SYN, ACK and FIN in the corresponding ACL are not supported.</p> <p>To use the match access-group command, you must first enter the class-map command to specify the name of the class whose match criteria you want to establish. You can specify up to eight IPv4 and IPv6 ACLs in a match statement.</p> <p>QoS classification based on the packet length or TTL (time to live) field in the IPv4 and IPv6 headers is not supported.</p> <p>When an ACL list is used within a class-map, the deny action of the ACL is ignored and the traffic is classified based on the specified ACL match parameters.</p>	

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to specify a class map called map1 and configures map1 to be used as the match criteria for this class:

```
RP/0/RP0/CPU0:router(config)# class-map map1
RP/0/RP0/CPU0:router(config-cmap)# match access-group ipv4 map1
```

Related Commands

Command	Description
class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.

match cos

To identify specified class of service (CoS) values as a match criteria in a class map, use the **match cos** command in class map configuration mode. To remove a specified CoS class value from the matching criteria for a class map, use the **no** form of this command.

```
match [not] cos cos-value [cos-value1 . . . cos-value7]  
no match cos cos-value [cos-value1 . . . cos-value7]
```

Syntax Description	not (Optional) Negates the specified match result.				
	<i>cos-value</i> Identifier that specifies the exact value from 0 to 7. Up to eight CoS identifiers can be specified to match packets.				
Command Default	No match criteria are specified.				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				

Usage Guidelines The **match cos** command specifies a class of service that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match cos** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match cos** command in a class map, the values of subsequent match statements are added to the first **match cos** command.

The **match cos** command is supported on egress Layer 3 physical interfaces.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map cos146 evaluates all packets entering HundredGigE interface 0/7/0/0.100 for class of service values of 1, 4, or 6. If the incoming packet has been marked with any of these CoS values, the packet is queued to the class queue with the bandwidth setting of 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map cos146  
RP/0/RP0/CPU0:router(config-cmap)# match cos 1 4 6  
RP/0/RP0/CPU0:router(config-cmap)# exit  
  
RP/0/RP0/CPU0:router(config)# policy-map policy1
```

```
RP/0/RP0/CPU0:router(config-pmap)# class cos146
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	match access-group, on page 19	Identifies a specified access control list (ACL) number as the match criteria for a class map.
	match destination-address, on page 23	Identifies a specific destination MAC address explicitly as a match criterion in a class map.
	match cos, on page 21	Identifies specified class of service (CoS) values as a match criteria in a class map.
	match discard-class	Identifies specific discard class values as a match criteria for a class map.
	match dscp, on page 27	Identifies specific IP differentiated services code point (DSCP) values as match criteria for a class map.
	match precedence, on page 32	Identifies IP precedence values as match criteria.
	match protocol, on page 35	Identifies a specific protocol as the match criterion for a class map.
	match qos-group, on page 37	Identifies specific quality-of-service (QoS) group values as match criteria in a class map.
	match source-address, on page 39	Identifies a specific source MAC address as match criterion in a class map.
	match vlan, on page 41	Identifies selected VLAN IDs as the match criteria for a class map.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	set cos, on page 68	Sets the Layer 2 class of service (CoS) value of an outgoing packet.

match destination-address

To identify a specific destination MAC address explicitly as a match criterion in a class map, use the **match destination-address** command in class map configuration mode. To remove a specific destination MAC address from the matching criteria for a class map, use the **no** form of this command.

```
match destination-address mac address
no match destination-address mac address
```

Syntax Description	mac Specifies a MAC address.				
	address Specifies a destination MAC address.				
Command Default	No default behavior or values				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				

Usage Guidelines

The **match destination-address** command specifies a destination address that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match destination-address** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match destination-address** command in a class map, only the last command entered applies.

The **match destination-address** command is supported only on an output service policy.

Layer 2 match criteria on a Layer 3 target, or Layer 3 match criteria on a Layer 2 target, is not allowed. The **match destination-address** command is supported on egress Layer 2 interfaces, Layer 2 subinterfaces, and Layer 3 physical interfaces. Layer 3 physical interfaces are supported, because it is possible for a Layer 3 interface to have underlying Layer 2 subinterfaces.

The command is allowed on a policy map that is attached to an Ethernet interface. The command is invalid on a policy that is attached to a Packet-over-SONET/SDH (POS) interface or a routed VLAN subinterface.

The match 48-bit MAC address is specified in xxxx.xxxx.xxxx format on L2VPN PE interfaces.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to match a destination MAC address:

```
RP/0/RP0/CPU0:router(config)#class-map match-any A
RP/0/RP0/CPU0:router(config-cmap)# match destination-address mac 000.f0d0.2356
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	match cos, on page 21	Identifies specified class of service (CoS) values as a match criteria in a class map.
	match discard-class	Identifies specific discard class values as a match criteria for a class map.
	match dscp, on page 27	Identifies specific IP differentiated services code point (DSCP) values as match criteria for a class map.
	match mpls experimental topmost, on page 30	Identifies specific three-bit experimental (EXP) field values in the topmost Multiprotocol Label Switching (MPLS) label as match criteria for a class map.
	match precedence, on page 32	Identifies IP precedence values as match criteria.
	match protocol, on page 35	Identifies a specific protocol as the match criterion for a class map.
	match qos-group, on page 37	Identifies specific quality-of-service (QoS) group values as match criteria in a class map.
	match source-address, on page 39	Identifies a specific source MAC address as match criterion in a class map.
	match vlan, on page 41	Identifies selected VLAN IDs as the match criteria for a class map.

match discard-class

To identify specific discard class values as a match criteria for a class map, use the **match discard-class** command in class map configuration mode. To remove specified discard class values from the matching criteria for a class map, use the **no** form of this command.

```
match [not] discard-class discard-class-value [discard-class-value1 . . . discard-class-value7]
no match [not] discard-class discard-class-value [discard-class-value1 . . . discard-class-value7]
```

Syntax Description	not (Optional) Negates the specified match result.				
	<i>discard-class-value</i> Discard class identifier. You can specify up to eight discard class identifiers to match packets. Class identifiers are separated by spaces. Range is 0 to 7.				
Command Default	No default behavior or values				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Command</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Command	Description	Release 5.0.0	This command was introduced.
Command	Description				
Release 5.0.0	This command was introduced.				

Usage Guidelines The **match discard-class** command specifies a discard class that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match discard-class** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match discard-class** command in a class map, the new values are added to the existing match statement.

The **match discard-class** command sets the match criteria for examining discard classes marked on the packet. Up to eight discard class values can be matched in one match statement. For example, **match discard-class 0 1 2 3 4 5 6 7** returns matches for discard class values 0, 1, 2, 3, 4, 5, 6, and 7. Only one of the seven values is needed to yield a match (OR operation).

The discard class value is used as a matching criterion only. The value has no mathematical significance. For instance, the discard class value 2 is not greater than 1. The value simply indicates that a packet marked with the discard class of 2 should be treated differently than a packet marked with a discard class value of 1.

The **match discard-class** command is not supported on the Asynchronous Transfer Mode (ATM) interfaces.



Note The **match discard-class** command is applied only for egress policies.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows a service policy called policy1 attached to an interface. In this example, class map discard class5 is created to evaluate all packets leaving HundredGigE 0/7/0/0 interface for a discard-class value of 5. Packets marked with the discard class value of 5 are queued to a class queue with the bandwidth setting 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map discard-class5
RP/0/RP0/CPU0:router(config-cmap)# match discard-class 5
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class discard-class5
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy output policy1
```

match dscp

To identify specific IP differentiated services code point (DSCP) values as match criteria for a class map, use the **match dscp** command in class map configuration mode. To remove a DSCP value from a class map, use the **no** form of this command.

```
match dscp {[{ipv4]} dscp-value [dscp-value1 ... dscp-value7] |[min-value - max-value]}
no match dscp {[{ipv4]} dscp-value [dscp-value1 ... dscp-value7] |[min-value - max-value]}
```

Syntax Description

not (Optional) Negates the specified match result.

ipv4 (Optional) Specifies the IPv4 DSCP value.

dscp-value IP DSCP value identifier that specifies the exact value or a range of values. Range is 0 - 63. Up to eight IP DSCP values can be specified to match packets. Reserved keywords can be specified instead of numeric values. [Table 1: IP DSCP Reserved Keywords, on page 28](#) describes the reserved keywords.

min-value Lower limit of DSCP range to match. Value range is 0 - 63.

max-value Upper limit of DSCP range to match. Value range is 0 - 63.

Command Default

Matching on IP Version 4 (IPv4) packets is the default.

Command Modes

Class map configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.
Release 5.2.4	The <i>min-value</i> and <i>max-value</i> variables were added.

Usage Guidelines

The **match dscp** command specifies a DSCP value that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match dscp** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match dscp** command in a class map, only the last command entered applies.

The **match dscp** command examines the higher-order six bits in the type of service (ToS) byte of the IP header. Only one of the eight values is needed to yield a match (OR operation).

The command supports only eight IP DSCP values. If you try to configure more match statements after all the eight values are matched, the statements get rejected.

The IP DSCP value is used as a matching criterion only. The value has no mathematical significance. For instance, the IP DSCP value 2 is not greater than 1. The value simply indicates that a packet marked with the IP DSCP value of 2 should be treated differently than a packet marked with an IP DSCP value of 1. The treatment of these marked packets is defined by the user through the setting of policies in policy map class configuration mode.

Table 1: IP DSCP Reserved Keywords

DSCP Value	Reserved Keyword
0	default
10	AF11
12	AF12
14	AF13
18	AF21
20	AF22
22	AF23
26	AF31
28	AF32
30	AF33
34	AF41
36	AF42
38	AF43
46	EF
8	CS1
16	CS2
24	CS3
32	CS4
40	CS5
48	CS6
56	CS7
ipv4	ipv4 dscp

Task ID

Task ID Operations

qos read,
write

Examples

This example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map dscp14 evaluates all packets entering HundredGigE 0/7/0/0 for an IP DSCP value of 14. If the incoming packet has been marked with the IP DSCP value of 14, the packet is queued to the class queue with the bandwidth setting of 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map dscp14
RP/0/RP0/CPU0:router(config-cmap)# match dscp ipv4 14
RP/0/RP0/CPU0:router(config-cmap)# exit

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class dscp14
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

match mpls experimental topmost

To identify specific three-bit experimental (EXP) field values in the topmost Multiprotocol Label Switching (MPLS) label as match criteria for a class map, use the **match mpls experimental topmost** command in class map configuration mode. To remove experimental field values from the class map match criteria, use the **no** form of the command.

```
match [not] mpls experimental topmost exp-value [exp-value1 . . . exp-value7]
no match [not] mpls experimental topmost exp-value [exp-value1 . . . exp-value7]
```

Syntax Description

not **not**

exp-value Experimental value that specifies the exact value from 0 to 7. Up to eight experimental values can be specified to match MPLS headers.

Command Default

No default behavior or values

Command Modes

Class map configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

The **match mpls experimental topmost** command is used by the class map to identify MPLS experimental values matching on a packet.

To use the **match mpls experimental topmost** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match mpls experimental topmost** command in a class map, the new values are added to the existing match statement.

This command examines the three experimental bits contained in the topmost label of an MPLS packet. Up to eight experimental values can be matched in one match statement. For example, **match mpls experimental topmost 2 4 5 7** returns matches for experimental values of 2, 4, 5, and 7. Only one of the four values is needed to yield a match (OR operation).

The experimental values are used as a matching criterion only. The value has no mathematical significance. For instance, the experimental value 2 is not greater than 1. The value indicates that a packet marked with the experimental value of 2 should be treated differently than a packet marked with the EXP value of 1. The treatment of these different packets is defined by the user through the setting of QoS policies in policy map class configuration mode.

Task ID

Task ID	Operations
qos	read, write

Examples

This example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map mplsmapl evaluates all packets entering HundredGigE 0/7/0/0 for an MPLS experimental value of 1. If the incoming packet has been marked with the MPLS experimental value of 1, the packet is queued to the class queue with the bandwidth setting of 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map mplsmapl
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 1
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class mplsmapl
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands

Command	Description
class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
match dscp, on page 27	Identifies specific IP differentiated services code point (DSCP) values as match criteria for a class map.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
set mpls experimental, on page 76	Sets the experimental (EXP) value of the Multiprotocol Label Switching (MPLS) packet topmost or imposition labels.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

match precedence

To identify IP precedence values as match criteria, use the **match precedence** command in class map configuration mode. To remove precedence values from a class map, use the **no** form of this command.

```
match [not] precedence [{ipv4 | ipv6}] precedence-value [precedence-value1 . . . precedence-value7]
no match [not] precedence [{ipv4 | ipv6}] precedence-value [precedence-value1 . . .
precedence-value7]
```

Syntax Description

not	(Optional) Negates the specified match result.
ipv4	(Optional) Specifies the IPv4 precedence value.
ipv6	(Optional) Specifies the IPv6 precedence value.
<i>precedence-value</i>	An IP precedence value identifier that specifies the exact value. Range is from 0 to 7. Reserved keywords can be specified instead of numeric values. Table 2: IP Precedence Values and Names, on page 33 describes the reserved keywords. Up to eight precedence values can be matched in one match statement.

Command Default

Matching on both IP Version 4 (IPv4) and IPv6 packets is the default.

Command Modes

Class map configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

The **match precedence** command specifies a precedence value that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match precedence** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match precedence** command in a class map, only the last command entered applies.

The **match precedence** command examines the higher-order three bits in the type of service (ToS) byte of the IP header. Up to eight precedence values can be matched in one match statement. For example, **match precedence ipv4 0 1 2 3 4 5 6 7** returns matches for IP precedence values of 0, 1, 2, 3, 4, 5, 6, and 7. Only one of the eight values is needed to yield a match (OR operation).

The precedence values are used as a matching criterion only. The value has no mathematical significance. For instance, the precedence value 2 is not greater than 1. The value simply indicates that a packet marked with the precedence value of 2 is different than a packet marked with the precedence value of 1. The treatment of these different packets is defined by the user through the setting of QoS policies in policy map class configuration mode.

This table lists the IP precedence value number and associated name in descending order of importance.

Table 2: IP Precedence Values and Names

Value	Name
0	routine
1	priority
2	immediate
3	flash
4	flash-override
5	critical
6	internet
7	network
ipv4	ipv4 precedence
ipv6	ipv6 precedence

Task ID**Task ID Operations**

qos	read, write
-----	----------------

Examples

This example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map ipprec5 evaluates all packets entering HundredGigE 0/7/0/0 for a precedence value of 5. If the incoming packet has been marked with the precedence value of 5, the packet is queued to the class queue with the bandwidth setting 300 kbps.

```
RP/0/RP0/CPU0:router# configure
RP/0/RP0/CPU0:router(config)# class-map ipprec5
RP/0/RP0/CPU0:router(config-cmap)# match precedence ipv4 5
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class ipprec5
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	set precedence, on page 78	Sets the precedence value in the IP header.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

match protocol

To identify a specific protocol as the match criterion for a class map, use the **match protocol** command in class map configuration mode. To remove protocol-based match criteria from a class map, use the **no** form of this command.

```
match [not] protocol {protocol-value [protocol-value1 . . . protocol-value7] | [min-value - max-value]}
```

```
no match [not] protocol {protocol-value [protocol-value1 . . . protocol-value7] | [min-value - max-value]}
```

Syntax Description

not (Optional) Negates the specified match result.

protocol-value A protocol identifier. A single value for *protocol-value* (any combination of numbers and names) can be matched in one match statement.

min-value Lower limit of protocol range to match. Value range is 0 - 255.

max-value Upper limit of protocol range to match. Value range is 0 - 255.

Command Default

No default behavior or values

Command Modes

Class map configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.
Release 5.2.4	The <i>min-value</i> and <i>max-value</i> variables were added.

Usage Guidelines

Definitions of traffic classes are based on match criteria, including protocols, access control lists (ACLs), input interfaces, QoS labels, and experimental (EXP) field values. Packets satisfying the match criteria for a class constitute the traffic for that class.

The **match protocol** command specifies the name of a protocol to be used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map. Available protocol names are listed in the table that follows.

The *protocol-value* argument supports a range of protocol numbers. After you identify the class, you may use the **match protocol** command to configure its match criteria.

Table 3: Protocol Names and Descriptions

Name	Description
ahp	Authentication Header Protocol
eigrp	Cisco Enhanced Interior Gateway Routing Protocol

Name	Description
esp	Encapsulation Security Payload
gre	Cisco Generic Routing Encapsulation Tunneling
icmp	Internet Control Message Protocol
igmp	Internet Gateway Message Protocol
igrp	Cisco IGRP Routing protocol
ipinip	IP in IP tunneling
ipv4	Any IPv4 protocol
ipv6	Any IPv6 protocol
mpls	Any MPLS packet
nos	KA9Q NOS Compatible IP over IP Tunneling
ospf	Open Shortest Path First, Routing Protocol
pcp	Payload Compression Protocol
pim	Protocol Independent Multicast
sctp	Stream Control Transmission Protocol
tcp	Transport Control Protocol
udp	User Datagram Protocol

Task ID**Task ID** **Operations**

qos	read, write
-----	----------------

Examples

In this example, all TCP packets belong to class class1:

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match protocol tcp
```

match qos-group

To identify specific quality-of-service (QoS) group values as match criteria in a class map, use the **match qos-group** command in class map configuration mode. To remove a specific QoS group value from the matching criteria for a class map, use the **no** form of this command.

```
match [not] qos-group [qos-group-id lower-limit]  
no match qos-group
```

Syntax Description	not (Optional) Negates the specified match result.				
	<i>qos-group-id</i> QoS group identifier that specifies the exact value from 0 to 511 or a range of values from 0 to 511.				
	<i>lower-limit</i> Specifies the lower limit of QoS group that should be matched.				
Command Default	No match criteria are specified.				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				
Usage Guidelines	<p>The match qos-group command sets the match criteria for examining QoS groups marked on the packet. Up to eight QoS group values can be matched in one match statement. For example, match qos-group 4 9 11 15 16 21 30 31 returns matches for QoS group values of 30, and 31. Only one of the eight values is needed to yield a match (OR operation).</p> <p>The QoS group value is used as a matching criterion only. The value has no mathematical significance. For instance, the QoS group value 2 is not greater than 1. The value simply indicates that a packet marked with the QoS group value of 2 should be treated differently than a packet marked with a QoS group value of 1. The treatment of these different packets is defined using the service-policy command in policy map class configuration mode.</p> <p>The QoS group setting is limited in scope to the local router. Typically, the QoS group is set on the local router and is used in conjunction with WRED or MDRR to give differing levels of service based on the group identifier.</p>				
Task ID	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>qos</td> <td>read, write</td> </tr> </tbody> </table>	Task ID	Operations	qos	read, write
Task ID	Operations				
qos	read, write				

Examples

This example shows a service policy called policy1 attached to an interface. In this example, class map qosgroup5 will evaluate all packets leaving HundredGigE 0/7/0/0 for a QoS group value of 5.

If the packet has been marked with the QoS group value of 5, the packet is queued to the class queue with the bandwidth setting 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map qosgroup5
RP/0/RP0/CPU0:router(config-cmap)# match qos-group 5
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class qosgroup5
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	set discard-class, on page 72	Sets the discard class and Quality of Service (QoS) group identifiers on IP Version 4 (IPv4) or Multiprotocol Label Switching (MPLS) packets.
	set qos-group, on page 80	Sets the quality of service (QoS) group identifiers on packets.

match source-address

To identify a specific source MAC address as match criterion in a class map, use the **match source-address** command in class map configuration mode. To remove a specific source MAC address from the matching criteria for a class map, use the **no** form of this command.

```
match source-address mac address
no match source-address mac address
```

Syntax Description	mac Specifies a MAC address				
	address Specifies a source MAC address.				
Command Default	No default behavior or values				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				

Usage Guidelines The **match source-address** command specifies a source address that is used as the match criterion against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match source-address** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match source-address** command in a class map, only the last command entered applies.

This command is supported on an input service policy only.

Layer 2 match criteria on a Layer 3 target, or Layer 3 match criteria on a Layer 2 target is not allowed.

The **match source-address** command is supported on egress Layer 2 interfaces, Layer 2 subinterfaces, and Layer 3 physical interfaces. Layer 3 physical interfaces are supported, because it is possible for a Layer 3 interface to have underlying Layer 2 subinterfaces.

The **match source-address** command is allowed on a policy map that is attached to an Ethernet interface. The command is invalid on a policy that is attached to a Packet-over-SONET/SDH (POS) interface or a routed VLAN subinterface.

The match 48-bit MAC address is specified in xxxx.xxxx.xxxx format on L2VPN PE interfaces.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to match a source MAC address:

```
RP/0/RP0/CPU0:router(config)# class-map match-any A
RP/0/RP0/CPU0:router(config-cmap)# match source-address mac 0003.f0d0.2356
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.

match vlan

To identify selected VLAN IDs as the match criteria for a class map, use the **match vlan** command in class map configuration mode. To remove VLAN ID match criteria from a class map, use the **no** form of this command.

```
match vlan  vlanid [vlanid1 ... vlanid7]
no match vlan  vlanid [vlanid1 ... vlanid7]
```

Syntax Description	<p><i>vlanid</i> VLAN identifier that specifies the exact value from 1 to 4094 or a range of values from 1 to 4094. Up to eight values can be specified in a match statement.</p> <p>Note The router supports up to eight values or ranges on a single match statement, and up to 300 values or ranges specified on up to eight match statements.</p>				
Command Default	No match criteria are specified.				
Command Modes	Class map configuration				
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.
Release	Modification				
Release 5.0.0	This command was introduced.				

Usage Guidelines The **match vlan** command specifies a VLAN ID that is used as the match criteria against which packets are checked to determine if they belong to the class specified by the class map.

To use the **match vlan** command, you must first enter the **class-map** command to specify the name of the class whose match criteria you want to establish. If you specify more than one **match vlan** command in a class map, up to eight values of the subsequent match statements are added to the first **match vlan** command, exceeding which, the statement is rejected.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to configure the service policy called policy1 and attach service policy policy1 to an interface. In this example, class map vlan1 evaluates all packets entering HundredGigE 0/7/0/0 for VLAN IDs of 1234, 1698, and all the VLAN IDs in the range 3000 to 4000. If the incoming packet has been marked with any of these VLAN IDs, the packet is queued to the class queue with the bandwidth setting of 300 kbps.

```
RP/0/RP0/CPU0:router(config)# class-map vlan1
RP/0/RP0/CPU0:router(config-cmap)# match vlan 1234 1698 3000-4000
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class vlan1
```

```
RP/0/RP0/CPU0:router(config-pmap-c)# bandwidth 300
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands

Command	Description
class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.

police rate

To configure traffic policing and enter policy map police configuration mode, use the **police rate** command in policy map class configuration mode. To remove traffic policing from the configuration, use the **no** form of this command.

```
police rate {value [units] | percent percentage | per-thousand value | per-million value} [burst
burst-size [burst-units]] [peak-rate {value [units] | percent percentage}] [peak-burst peak-burst
[burst-units]]
no police rate {value [units] | percent percentage | per-thousand value | per-million value} [burst
burst-size [burst-units]] [peak-rate {value [units] | percent percentage}] [peak-burst peak-burst
[burst-units]]
```

Syntax Description	
<i>value</i>	Committed information rate (CIR). Range is from 1 to 4294967295.
<i>units</i>	(Optional) Unit of measurement for the CIR. Values can be: <ul style="list-style-type: none"> • bps —bits per second (default) • gbps —gigabits per second • kbps —kilobits per second • mbps —megabits per second
percent <i>percentage</i>	Specifies the police rate as a percentage of the CIR. Range is from 1 to 100. See the Usage Guidelines for information on how to use this keyword.
per-thousand <i>value</i>	Specifies the committed information rate in per thousand of the link bandwidth.
per-million <i>value</i>	Specifies the committed information rate in per million of the link bandwidth.
burst <i>burst-size</i>	(Optional) Specifies the burst size (in the specified <i>burst-units</i>). Range is from 1 to 4294967295.
<i>burst-units</i>	(Optional) Unit of measurement for the burst values. Values can be: <ul style="list-style-type: none"> • bytes —bytes (default) • gbytes —gigabytes • kbytes —kilobytes • mbytes —megabytes • ms —milliseconds • us —microseconds
peak-rate <i>value</i>	(Optional) Specifies the Peak Information Rate (PIR) in the specified <i>units</i> . Range is from 1 to 4294967295.
peak-burst <i>peak-burst</i>	(Optional) Specifies the peak burst size in the specified <i>burst-units</i> . The range is from 1 to 4294967295.

Command Default No restrictions on the flow of data are applied to any interface.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines

The **police rate** can set the DSCP, the precedence, or the discard class for IP packets, and experimental and discard-class values for MPLS packets.

Policing can be applied in both ingress and egress directions.

The parameters set by the action keywords are rounded by the hardware. To check the actual values programmed in the hardware use the **show qos interface** command.

For **police rate** commands, interpret the **percent** keyword in this way:

- For a one-level policy, the **percent** keyword specifies the CIR as a percentage of the link rate. For example, the command **police rate percent 35** configures the CIR as 35% of the link rate.
- For a two-level policy, in the parent policy, the **percent** keyword specifies the parent CIR as a percentage of the link rate. In the child policy, the **percent** keyword specifies the child CIR as a percentage of the maximum policing or shaping rate of the parent. If traffic policing or shaping is not configured on the parent, the parent inherits the interface policing or shaping rate.

Hierarchical policing is also supported. In such a configuration, both parent and child policies have class-maps containing policing statements, as in this example:

```
!
policy-map child
  class gold
    police rate percent 50
    conform-action set precedence immediate
    exceed-action drop
  !
!
policy-map parent
  class match_all
    police rate 10000 kbps burst 15000
    exceed-action drop
    service-policy child
  !
```

For more information, see the "Committed Bursts and Excess Bursts" section in the *Modular QoS Configuration Guide for Cisco NCS 6000 Series Routers* Modular Quality of Service Configuration Guide for Cisco NCS 6000 Series Routers.

Task ID	Task ID	Operations
	qos	read, write

In this example for MPLS, traffic policing is configured with the average rate at 250 kbps, and the normal burst size at 50 bytes for all packets leaving HundredGigE interface 0/1/0/0:

```
RP/0/RP0/CPU0:router (config)# class-map class1
```

```

RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 0
RP/0/RP0/CPU0:router(config-cmap)# exit

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# police rate 250 kbps burst 50
RP/0/RP0/CPU0:router(config-pmap-c-police)# conform-action set mpls experimental topmost 4
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/7/0/0
RP/0/RP0/CPU0:router(config-if) service-policy input policy1

```

Related Commands

Command	Description
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

policy-map

To create or modify a policy map that can be attached to one or more interfaces to specify a service policy, use the **policy-map** command in XR Config mode. To delete a policy map, use the **no** form of this command.

policy-map [**type qos**] *policy-name*
no policy-map [**type qos**] *policy-name*

Syntax Description		
	type qos	(Optional) Specifies type of the service policy.
	qos	(Optional) Specifies a quality-of-service (QoS) policy map.
	pbr	(Optional) Specifies a policy-based routing (PBR) policy map.
	<i>policy-name</i>	Name of the policy map.

Command Default A policy map does not exist until one is configured. Because a policy map is applied to an interface, no restrictions on the flow of data are applied to any interface until a policy map is created.

Type is QoS when not specified.

Command Modes XR Config mode

Command History	Release	Modification
	Release 5.0.0	This command was introduced.
	Release 5.2.4	The pbr keyword was added.

Usage Guidelines Use the **policy-map** command to specify the name of the policy map to be created, added to, or modified before you can configure policies for classes whose match criteria are defined in a class map. Entering the **policy-map** command enables policy map configuration mode in which you can configure or modify the class policies for that policy map.

You can configure class policies in a policy map only if the classes have match criteria defined for them. Use the **class-map** and **match** commands to configure the match criteria for a class. Because you can configure a maximum of 1024 classes in one policy map, no policy map can contain more than 1024 class policies. The maximum number of 1024 classes per policy includes the implicit default class and its child policies.

A single policy map can be attached to multiple interfaces concurrently.

Task ID	Task ID	Operations
	qos	read, write

Examples

These examples show how to create a policy map called policy1 and configures two class policies included in that policy map. The policy map is defined to contain policy specification for class1 and the default class (called class-default) to which packets that do not satisfy configured match criteria are directed. Class1 specifies policy for traffic that matches access control list 136.

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match access-group ipv4 136

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# police rate 250

RP/0/RP0/CPU0:router(config-pmap-c)# exit

RP/0/RP0/CPU0:router(config-pmap)# class class-default
RP/0/RP0/CPU0:router(config-pmap-c)# queue-limit 1000000 bytes
```

priority (QoS)

To assign priority to a traffic class based on the amount of available bandwidth within a traffic policy, use the **priority** command in policy map class configuration mode. To remove a previously specified priority for a class, use the **no** form of this command.

priority [*level priority-level*]
no priority

Syntax Description

level *priority-level* (Optional) Sets multiple levels of priority to a traffic class. Value can be 1 or 2. Default level is 1. Level 1 traffic has higher priority.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.
Release 5.3.2	Priority levels 4, 5, 6 and 7 are added.

Usage Guidelines

The **priority** command configures low-latency queueing (LLQ), providing strict priority queueing (PQ). Strict PQ allows delay-sensitive data such as voice to be dequeued and sent before packets in other queues are dequeued. When a class is marked as high priority using the **priority** command, we recommend that you configure a policer to limit the priority traffic. This policer ensures that the priority traffic does not starve all other traffic on the line card, which protects low-priority traffic from starvation. Use the **police rate** to explicitly configure the policer.

The **priority** command sets up classes based on a variety of criteria (not just User Datagram Protocol [UDP] ports) and assigns a priority to them.

The **bandwidth** and **priority** commands cannot be used in the same class, within the same policy map. These commands can be used together in the same policy map .

Task ID

Task ID	Operations
qos	read, write

Examples

This example shows how to configure priority queueing for the policy map named policy1:

```
RP/0/RP0/CPU0:router (config) # policy-map policy1
RP/0/RP0/CPU0:router (config-pmap) # class class1
```

```
RP/0/RP0/CPU0:router(config-pmap-c)# priority level 1  
(config-pmap-c)#police rate percent 20
```

Related Commands	Command	Description
	bandwidth (QoS), on page 3	Specifies the minimum bandwidth allocated to a class belonging to a policy map.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

queue-limit

To specify or modify the maximum number of packets the queue can hold for a class policy configured in a policy map, use the **queue-limit** command in policy map class configuration mode. To remove the queue packet limit from a class, use the **no** form of this command.

queue-limit *value* [*unit*]
no queue-limit

Syntax Description

value Maximum threshold for tail drop in bytes. Range is from 1 to 4294967295.

unit (Optional) Units for the queue limit value. Values can be:

- **bytes** —bytes
- **ms** —milliseconds
- **packets** —packets (default)
- **us** —microseconds

Note When the specified *units* is packets, packets are assumed to be 256 bytes in size.

Command Default

100 milliseconds: maximum threshold for tail drop
 10 milliseconds: maximum threshold for high-priority queues
 Maximum threshold units are in packets.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

Packets satisfying the match criteria for a class accumulate in the queue reserved for the class until they are serviced by the scheduling mechanism. The **queue-limit** command defines the maximum threshold for a class. When that threshold is reached, enqueued packets to the class queue result in tail drop (packet drop). Tail drop is a congestion avoidance technique that drops packets when an output queue is full, until congestion is eliminated.

Use the **show qos interface** command to display the queue limit and other policer values.

Guaranteed Service Rate

The guaranteed service rate is defined as the service rate of the queue when all queues are backlogged and derived as:

$$\text{minimum_bandwidth} + (\text{bandwidth_remaining_percent} * \text{unallocated_bandwidth})$$

This example shows the guaranteed service rate calculation:

```

policy-map sample_policy
  class c1
    bandwidth percent 30
    bandwidth remaining percent 40
  class c2
    bandwidth percent 20
  class class-default

```

guaranteed service rate of c1 = 30 percent LR + (40 percent * 50 percent * LR)

guaranteed service rate of c2 = 20 percent LR + (30 percent * 50 percent * LR)

guaranteed service rate of class-default = 30 percent * 50 percent * LR

- Where LR is line rate of the target on which service policy "sample_policy" is attached.
- 50 percent is unallocated bandwidth.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to set the queue limit for a class to 1000000 packets for policy map policy1:

```

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# queue-limit 1000000

```

Related Commands	Command	Description
	class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	show qos interface , on page 90	Displays QoS information for a specific interface.

random-detect

To enable random early detection (RED), use the **random-detect** command in policy map class configuration mode. To remove RED, use the **no** form of this command.

random-detect {**cos** *value* | **default** | **discard-class** *value* | **dscp** *value* | **exp** *value* | **precedence** *value* | *min-threshold* [*units*] *max-threshold* [*units*]}
no random-detect

Syntax Description

cos <i>value</i>	COS-based WRED.
default	Enables RED with default minimum and maximum thresholds.
discard-class <i>value</i>	Discard-class based WRED.
dscp <i>value</i>	DSCP-based WRED.
exp <i>value</i>	MPLS Experimental-based WRED.
precedence <i>value</i>	Precedence-based WRED. Values can be: <ul style="list-style-type: none"> • 0 or routine • 1 or priority • 2 or immediate • 3 or flash • 4 or flash-override • 5 or critical • 6 or internet • 7 or network
<i>min-threshold</i>	Minimum threshold in number of packets. The value range of this argument is from 0 to 1073741823 in bytes.
<i>max-threshold</i>	Maximum threshold the units specified. The value range of this argument is from the value of the <i>min-threshold</i> argument or 23, whichever is larger, to 1073741823. When the queue length exceeds the maximum threshold, RED drops all packets with the specified discard class value.
<i>units</i>	(Optional) Units for the threshold values. Values can be: <ul style="list-style-type: none"> • bytes—bytes • gbytes—gigabytes • kbytes—kilobytes • mbytes—megabytes • ms—milliseconds • packets—packets (default) • us—microseconds

Command Default

Default unit for *max-threshold* and *min-threshold* is **packets**.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The RED congestion avoidance technique takes advantage of the congestion control mechanism of TCP. By randomly dropping packets before periods of high congestion, RED tells the packet source to decrease its transmission rate. Assuming the packet source is using TCP, it decreases its transmission rate until all the packets reach their destination, indicating that the congestion is cleared. You can use RED as a way to cause TCP to slow transmission of packets. TCP not only pauses, but it also restarts quickly and adapts its transmission rate to the rate that the network can support.

RED distributes losses in time and maintains normally low queue depth while absorbing traffic bursts. When enabled on an interface, RED begins dropping packets when congestion occurs at a rate you select during configuration.

When time units are used, the guaranteed service rate is used to compute thresholds.

The mark probability is always set to 1.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Weighted Random Early Detection

The following restrictions apply to Weighted Random Early Detection (WRED):

- For thresholds in time units, the guaranteed service rate is used to calculate the thresholds in bytes.
- Default RED minimum threshold—30ms at the guaranteed service rate.
- Default RED maximum threshold—100 ms at the guaranteed service rate.

For bundles, queue limit and WRED thresholds are supported in time units only.



Note RED is enabled when you configure any of the supported **random-detect** commands.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to enable RED using a minimum threshold value of 1000000 and a maximum threshold value of 2000000:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect 1000000 2000000
```

Related Commands

Command	Description
random-detect precedence, on page 63	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a particular IP precedence.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

random-detect cos

To configure Weighted Random Early Detection (WRED) thresholds for packets with a specific class of service (CoS) value, use the **random-detect cos** command in policy map class configuration mode. To return the thresholds to the default for the CoS, use the **no** form of this command.

```
random-detect cos cos-value min-threshold [units] max-threshold [units]
no random-detect cos cos-value min-threshold [units] max-threshold [units]
```

Syntax Description	
<i>cos-value</i>	CoS value. Valid values are from 0 to 7. Up to eight values can be entered separated by commas.
<i>min-threshold</i>	Minimum threshold in number of packets. The value range of this argument is from 0 to 1073741823 in bytes.
<i>max-threshold</i>	Maximum threshold in number of packets. The value range of this argument is from the value of the <i>min-threshold</i> argument to 1073741823.
<i>units</i>	(Optional) Units for the threshold values. Values can be: <ul style="list-style-type: none"> • bytes —bytes • gbytes —gigabytes • kbytes —kilobytes • mbytes —megabytes • ms —milliseconds • packets —packets (default) • us —microseconds

Command Default Default unit for *max-threshold* and *min-threshold* is **packets**.
min-threshold: 30 ms
max-threshold: 100 ms

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The **random-detect cos** command is allowed in a service policy attached to a Layer 2 VPN attachment circuit or physical Ethernet interface only. (The command is invalid in a policy attached to a Layer 3 interface.)



Note Only time-based units are allowed on bundle targets.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Task ID

Task ID	Operations
---------	------------

qos	read, write
-----	----------------

Examples

This example shows how to configure CoS:

```
RP/0/RP0/CPU0:router(config)# policy-map map1
RP/0/RP0/CPU0:router(config-pmap)# class c
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect cos 3 1000 bytes 2000 bytes
```

random-detect discard-class

To configure the Weighted Random Early Detection (WRED) thresholds for packets with a specific discard class value, use the **random-detect discard-class** command in policy map class configuration mode. To return the thresholds to the default for the discard class, use the **no** form of this command.

```
random-detect discard-class discard-value min-threshold [units] max-threshold [units]
no random-detect discard-class discard-value min-threshold [units] max-threshold [units]
```

Syntax Description	
<i>discard-value</i>	Discard class value. Valid values are from 0 to 7. Up to eight values can be entered separated by commas.
<i>min-threshold</i>	Minimum threshold in number of packets. The value range of this argument is from 0 to 1073741823 in bytes.
<i>max-threshold</i>	Maximum threshold in number of packets. The value range of this argument is from the value of the <i>min-threshold</i> argument to 1073741823. When the average queue length exceeds the maximum threshold, WRED drops all packets with the specified discard class value.
<i>units</i>	(Optional) Units for the threshold values. Values can be: <ul style="list-style-type: none"> • bytes—bytes • gbytes—gigabytes • kbytes—kilobytes • mbytes—megabytes • ms—milliseconds • packets—packets (default) • us—microseconds

Command Default Default unit for *max-threshold* and *min-threshold* is **packets**.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines WRED is a congestion avoidance mechanism that slows traffic by randomly dropping packets when congestion exists. WRED is most useful with protocols like TCP that respond to dropped packets by decreasing the transmission rate.

When you configure the **random-detect discard-class** command on an interface, packets are given preferential treatment based on the discard class of the packet.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to set the discard class values for discard class 3 to a minimum byte threshold of 1000000 and a maximum byte threshold of 2000000:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect discard-class 3 1000000 2000000
```

Related Commands	Command	Description
	class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	random-detect precedence, on page 63	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a particular IP precedence.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

random-detect dscp

To configure the Weighted Random Early Detection (WRED) thresholds for packets with a specific differentiated services code point (DSCP) value, use the **random-detect dscp** command in policy map class configuration mode. To return the thresholds to the default for the DSCP value, use the **no** form of this command.

```
random-detect dscp dscp-value min-threshold [units] max-threshold [units]
no random-detect dscp dscp-value min-threshold [units] max-threshold [units]
```

Syntax Description

dscp-value DSCP value. Up to eight *dscp-values* (any combination of numbers, ranges, and reserved keywords) can be used separated by commas. The following arguments are supported:

- Number from 0 to 63 that sets the DSCP value.
- Range of DSCP values. Range is from 0 to 63.
- Reserved keywords can be specified instead of numeric values. [Table 1: IP DSCP Reserved Keywords, on page 28](#) describes the reserved keywords.

min-threshold Minimum threshold in number of packets. The value range of this argument is from 0 to 1073741823. When the average queue length reaches the minimum threshold, WRED randomly drops some packets with the specified DSCP value.

max-threshold Maximum threshold in number of packets. The value range of this argument is from the value of the *min-threshold* argument to 1073741823. When the average queue length exceeds the maximum threshold, WRED drops all packets with the specified DSCP value.

units (Optional) Units for the threshold values. Values can be:

- **bytes**—bytes
- **gbytes**—gigabytes
- **kbytes**—kilobytes
- **mbytes**—megabytes
- **ms**—milliseconds
- **packets**—packets (default)
- **us**—microseconds

Command Default

Match packets with default DSCP (000000).

Default unit for *max-threshold* and *min-threshold* is **packets**.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

WRED is a congestion avoidance mechanism that slows traffic by randomly dropping packets when congestion exists. WRED is most useful with protocols like TCP that respond to dropped packets by decreasing the transmission rate.

Reserved keywords can be specified instead of numeric values. See [Table 1: IP DSCP Reserved Keywords, on page 28](#) for the list of keywords.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Task ID

Task ID	Operations
qos	read, write

Examples

This example shows that for packets with DSCP AF11, the WRED minimum threshold is 1,000,000 bytes and the maximum threshold is 2,000,000 bytes:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect dscp AF11 1000000 2000000
```

Related Commands

Command	Description
class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
random-detect precedence, on page 63	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a particular IP precedence.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

random-detect exp

To configure the Weighted Random Early Detection (WRED) thresholds for packets marked with a specific MPLS experimental (EXP) bit value, use the **random-detect exp** command in policy map class configuration mode. To return the value to the default, use the **no** form of this command.

```
random-detect exp exp-value min-threshold [units] max-threshold [units]
no random-detect exp exp-value min-threshold [units] max-threshold [units]
```

Syntax Description	
<i>exp-value</i>	MPLS experimental value. Valid values are from 0 to 7. Up to eight values can be entered separated by commas.
<i>min-threshold</i>	Minimum threshold in number of packets. The value range of this argument is from 0 to 1073741823 in bytes.
<i>max-threshold</i>	Maximum threshold in units specified. The value range of this argument is from the value of the <i>min-threshold</i> argument to 1073741823. When the average queue length exceeds the maximum threshold, WRED drops all packets with the specified experimental value.
<i>units</i>	(Optional) Units for the threshold values. Values can be: <ul style="list-style-type: none"> • bytes—bytes • gbytes—gigabytes • kbytes—kilobytes • mbytes—megabytes • ms—milliseconds • packets—packets (default) • us—microseconds

Command Default Default unit for *max-threshold* and *min-threshold* is **packets**.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines WRED is a congestion avoidance mechanism that slows traffic by randomly dropping packets when congestion exists. WRED is most useful with protocols like TCP that respond to dropped packets by decreasing the transmission rate.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows that for Multiprotocol Label Switching (MPLS) packets with an EXP field value of 4, the WRED minimum threshold is 1,000,000 bytes and the maximum threshold is 2,000,000 bytes:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# random-detect exp 4 1000000 20000
```

Related Commands

Command	Description
class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
random-detect dscp, on page 59	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a specific differentiated services code point (DSCP) value.
random-detect precedence, on page 63	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a particular IP precedence.
show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

random-detect precedence

To configure the Weighted Random Early Detection (WRED) thresholds for packets with a particular IP precedence, use the **random-detect precedence** command in policy map class configuration mode. To return the thresholds to the default for the precedence, use the **no** form of this command.

```
random-detect precedence precedence-value min-threshold [units] max-threshold [units]
no random-detect precedence precedence-value min-threshold [units] max-threshold [units]
```

Syntax Description

<i>precedence-value</i>	An IP precedence value identifier that specifies the exact value. Range is from 0 to 7. Reserved keywords can be specified instead of numeric values. Table 2: IP Precedence Values and Names, on page 33 describes the reserved keywords. Up to eight values or reserved keywords can be entered separated by commas.
<i>min-threshold</i>	Minimum threshold in number of packets. Range is from 0 to 1073741823 in bytes.
<i>max-threshold</i>	Maximum threshold in the units specified. Range is from the value of the <i>min-threshold</i> argument to 1073741823. When the average queue length exceeds the maximum threshold, WRED drops all packets with the specified precedence value.
<i>units</i>	(Optional) Units for the threshold values. Values can be: <ul style="list-style-type: none"> • bytes—bytes • gbytes—gigabytes • kbytes—kilobytes • mbytes—megabytes • ms—milliseconds • packets—packets (default) • us—microseconds

Command Default

Default unit for *max-threshold* and *min-threshold* is **packets**.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 5.0.0	This command was introduced.

Usage Guidelines

WRED is a congestion avoidance mechanism that slows traffic by randomly dropping packets when congestion exists. WRED is most useful with protocols like TCP that respond to dropped packets by decreasing the transmission rate.

When you configure the **random-detect** command on an interface, packets are given preferential treatment based on the IP precedence of the packet. Use the **random-detect precedence** command to adjust the treatment for different precedences.

When the value of the *units* argument is packets, packets are assumed to be 256 bytes in size.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows that for packets with precedence 3, the WRED minimum threshold is 1,000,000 bytes and maximum threshold is 2,000,000 bytes:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)#random-detect precedence 3 1000000 2000000
```

Related Commands	Command	Description
	bandwidth (QoS), on page 3	Specifies the minimum bandwidth allocated to a class belonging to a policy map.
	class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	random-detect dscp, on page 59	Configures the Weighted Random Early Detection (WRED) thresholds for packets with a specific differentiated services code point (DSCP) value.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

service-policy (interface)

To attach a policy map to an input interface or output interface to be used as the service policy for that interface, use the **service-policy** command in the appropriate configuration mode. To remove a service policy from an input or output interface, use the **no** form of the command.

```
service-policy {input | output} policy-map account{layer1 | nolayer}
```

Syntax Description	input	Attaches the specified policy map to the input interface.
	output	Attaches the specified policy map to the output interface.
	<i>policy-map</i>	Name of a service policy map (created using the policy-map command) to be attached.
	account layer1	(Optional) Turns on Layer 1 QoS accounting.
	account nolayer2	(Optional) Turns off Layer 2 QoS-specific accounting and enables Layer 3 QoS accounting.

Command Default No service policy is specified.

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines You can attach a single policy map to one or more interfaces to specify the service policy for those interfaces. The class policies composing the policy map are then applied to packets that satisfy the class map match criteria for the class. To apply a new policy to an interface, you must remove the previous policy. A new policy cannot replace an existing policy.

Task ID	Task ID	Operations
	qos	read, write

Examples

service-policy (policy map class)

To use a service policy as a QoS policy within a policy map (called a *hierarchical service policy*), use the **service-policy** command in policy map class configuration mode. To disable a particular service policy as a QoS policy within a policy map, use the **no** form of this command.

service-policy [**type qos**] *policy-map-name*
no service-policy [**type qos**] *policy-map-name*

Syntax Description	type qos	(Optional) Specifies a QoS service policy.
	<i>policy-map-name</i>	Name of the predefined policy map to be used as a QoS policy. The name can be a maximum of 40 alphanumeric characters.

Command Default No service policy is specified.
 Type is QoS when not specified.

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The **service-policy (policy-map class)** command creates hierarchical service policies in policy-map class configuration mode.

This command is different from the **service-policy (interface)** command used in interface configuration mode.

The child policy is the previously defined service policy that is being associated with the class default of the parent policy-map. The new service policy using the preexisting service policy is the parent policy.

The **service-policy (policy-map class)** command has these restrictions:

- The **priority** command can be used in either the parent or the child policy, but not both policies simultaneously.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to create a hierarchical service policy in the service policy called parent:

```
RP/0/RP0/CPU0:router(config)# policy-map child
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# priority
```

```

RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map parent
RP/0/RP0/CPU0:router(config-pmap)# class class-default
RP/0/RP0/CPU0:router(config-pmap-c)# shape average 10000000
RP/0/RP0/CPU0:router(config-pmap-c)# service-policy child

```

Related Commands	Command	Description
	bandwidth (QoS), on page 3	Specifies the minimum bandwidth allocated to a class belonging to a policy map.
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	priority (QoS), on page 48	Assigns a priority to a class of traffic belonging to a policy map.
	service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

set cos

To set the Layer 2 class of service (CoS) value of an outgoing packet, use the **set cos** command in policy map class configuration mode. To remove a specific CoS value setting, use the **no** form of this command.

```
set cos cos-value
no set cos cos-value
```

Syntax Description	<i>cos-value</i> Specific IEEE 802.1Q CoS value from 0 to 7.
---------------------------	--

Command Default	No Layer 2 CoS value of an outgoing packet is set.
------------------------	--

Command Modes	Policy map class configuration
----------------------	--------------------------------

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines	<p>Use the set cos command to mark a packet that is being sent to a switch. Switches can leverage Layer 2 header information, including a CoS value marking.</p> <p>For Layer 3, the set cos command can be used only in service policies that are attached in the output direction of an interface. Packets entering an interface cannot be set with a CoS value.</p>
-------------------------	--

Task ID	Task ID	Operations
	qos	read, write

Examples

In this example, the policy map called cos-set is created to assign different CoS values for different service classes, and then is attached to the output HundredGigE subinterface 0/1/0/0.3 VLAN.

```
RP/0/RP0/CPU0:router(config)# policy-map cos-set
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# set cos 1
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# class class2
RP/0/RP0/CPU0:router(config-pmap-c)# set cos 2
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0.3
RP/0/RP0/CPU0:router(config-subif)# service-policy output cos-set
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

set dei

To set the drop eligible indicator (DEI) value in a policy map class, use the **set dei** command in policy map class configuration mode. To remove a specified DEI value from a policy map class, use the **no** form of this command.

```
set dei value
no set dei
```

Syntax Description

value Value of the DEI bit. Can be 0 or 1.

Command Default

There is no default DEI value; it must be specified.

Command Modes

Policy map class configuration

Command History

Release	Modification
Release 6.6.1	This command was introduced.

Usage Guidelines

The **set dei** command specifies a DEI value in a policy map class. For example, traffic can be policed and the excess traffic can be marked with DEI value of 1, so that it can be preferentially dropped in the egress interface or further downstream, when there is congestion.

Task ID

Task ID	Operation
qos	read, write

Examples

In this example, 802.1ad CoS plus DEI is derived from the incoming 802.1q CoS. Packets with a CoS value of 0 are remarked with a DEI value of 1.

```
RP/0/RP0/CPU0:router(config)# class-map match-any remark-cos
RP/0/RP0/CPU0:router(config-cmap)# match cos 0
RP/0/RP0/CPU0:router(config-cmap)# end-class-map
RP/0/RP0/CPU0:router(config)# policy-map p1
RP/0/RP0/CPU0:router(config-pmap)# class remark-cos
RP/0/RP0/CPU0:router(config-pmap-c)# set dei 1
RP/0/RP0/CPU0:router(config-pmap-c)# end-policy-map

RP/0/RP0/CPU0:router(config)# interface GigabitEthernet0/4/0/39.1 12transport
RP/0/RP0/CPU0:router(config-subif)# encapsulation dot1q 1
RP/0/RP0/CPU0:router(config-subif)# rewrite ingress tag push dot1ad 5 symmetric
RP/0/RP0/CPU0:router(config-subif)# service-policy input p1
```

Related Commands	Command	Description
	class (policy-map), on page 8	Specifies the name of the class whose policy you want to create or change.
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.

set discard-class

To set the discard class and Quality of Service (QoS) group identifiers on IP Version 4 (IPv4) or Multiprotocol Label Switching (MPLS) packets, use the **set discard-class** command in policy map class configuration mode. To leave the discard-class values unchanged, use the **no** form of this command.

```
set discard-class discard-class-value
no set discard-class discard-class-value
```

Syntax Description	<i>discard-class-value</i> Discard class ID. An integer from 0 to 7, to be marked on the packet.
---------------------------	--

Command Default	No default behavior or values
------------------------	-------------------------------

Command Modes	Policy map class configuration
----------------------	--------------------------------

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines The **set discard-class** command associates a discard class ID with a packet. After the discard class set, other QoS services such as Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) can operate on the bit settings.

Discard-class indicates the discard portion of the per hop behavior (PHB). The **set discard-class** command is typically used in Pipe mode. Discard-class is required when the input PHB marking is used to classify packets on the output interface.

The discard-class values can be used to specify the type of traffic that is dropped when there is congestion.



Note Marking of the discard class has only local significance on a node.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to set the discard class value to 5 for packets that match the MPLS experimental bits 1:

```
RP/0/RP0/CPU0:router(config)# class-map cust1
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 1
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy2
RP/0/RP0/CPU0:router(config-pmap)# class cust1
```

```
RP/0/RP0/CPU0:router(config-pmap-c)# set discard-class 5
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy2
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

set dscp

To mark a packet by setting the IP differentiated services code point (DSCP) in the type of service (ToS) byte, use the **set dscp** command in policy-map class configuration mode. To remove a previously set DSCP value, use the **no** form of this command.

```
set dscp [tunnel] dscp-value
no set dscp [tunnel] dscp-value
```

Syntax Description	tunnel (Optional) Sets the DSCP on the outer IP header for IPsec tunnels.
	dscp-value Number from 0 to 63 that sets the DSCP value. Reserved keywords can be specified instead of numeric values. Table 1: IP DSCP Reserved Keywords, on page 28 describes the reserved keywords.

Command Default No default behavior or values

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines After the DSCP bit is set, other quality-of-service (QoS) services can then operate on the bit settings. The network gives priority (or some type of expedited handling) to marked traffic. Typically, you set the DSCP value at the edge of the network (or administrative domain); data then is queued based on the DSCP value. Modified Deficit Round Robin (MDRR) can speed up handling for high DSCP traffic at congestion points. Weighted Random Early Detection (WRED) ensures that high DSCP traffic has lower loss rates than other traffic during times of congestion. Reserved keywords can be specified instead of numeric values. [Table 1: IP DSCP Reserved Keywords, on page 28](#) describes the reserved keywords.

Task ID	Task ID	Operations
	qos	read, write

Examples In this example, the DSCP ToS byte is set to 8 in the policy map called policy1. All packets that satisfy the match criteria of class1 are marked with the DSCP value of 8. The network configuration determines how packets are marked.

```
RP/0/RP0/CPU0:router (config)# policy-map policy1
RP/0/RP0/CPU0:router (config-pmap)# class class1
RP/0/RP0/CPU0:router (config-pmap-c)# set dscp 8
```

Related Commands	Command	Description
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.
	set precedence, on page 78	Sets the precedence value in the IP header.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

set mpls experimental

To set the experimental (EXP) value of the Multiprotocol Label Switching (MPLS) packet topmost or imposition labels, use the **set mpls experimental** command in policy map configuration mode. To leave the EXP value unchanged, use the **no** form of this command.

```
set mpls experimental {imposition | topmost} exp-value
no set mpls experimental {imposition | topmost} exp-value
```

Syntax Description	
imposition	Specifies to set the EXP value of the imposition label.
topmost	Specifies to set the EXP value of the topmost label.
<i>exp-value</i>	Value of the MPLS packet label. Range is 0 to 7.

Command Default No MPLS experimental value is set

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines After the MPLS experimental bits are set, other QoS services such as Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) then operate on the bit settings.

The network gives priority (or some type of expedited handling) to the marked traffic through the application of MDRR or WRED at points downstream in the network. Typically, the MPLS experimental value is set at the edge of the network (or administrative domain) and queuing is acted on it thereafter. MDRR can speed up handling for high-priority traffic at congestion points. WRED ensures that high-priority traffic has lower loss rates than other traffic during times of congestion.

Task ID	Task	Operations
	qos	read, write

Examples

This example shows how to set the MPLS experimental to 5 for packets that match access list 101:

```
RP/0/RP0/CPU0:router (config) # class-map class1
RP/0/RP0/CPU0:router (config-cmap) # match access-group ipv4 acl101
RP/0/RP0/CPU0:router (config-cmap) # exit

RP/0/RP0/CPU0:router (config) # policy-map policy1
RP/0/RP0/CPU0:router (config-pmap) # class class1
RP/0/RP0/CPU0:router (config-pmap-c) # set mpls experimental 5
RP/0/RP0/CPU0:router (config-pmap-c) # exit
```

```
RP/0/RP0/CPU0:router(config-pmap)# exit
```

```
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
```

```
RP/0/RP0/CPU0:router(config-if)# service-policy output policy1
```

Related Commands

Command	Description
class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

set precedence

To set the precedence value in the IP header, use the **set precedence** command in policy map class configuration mode. To leave the precedence value unchanged, use the **no** form of this command.

set precedence [**tunnel**] *value*
no set precedence [**tunnel**] *value*

Syntax Description	tunnel (Optional) Sets the IP precedence on the outer IP header. This command is available on Layer 3 interfaces in the ingress direction.
	value Number or name that sets the precedence bits in the IP header. Range is from 0 to 7. Reserved keywords can be specified instead of numeric values. Table 2: IP Precedence Values and Names, on page 33 describes the reserved keywords.
Command Default	No default behavior or values
Command Modes	Policy map class configuration
Command History	Release 5.0.0 This command was introduced.

Usage Guidelines Precedence can be set using a number or corresponding name. After IP Precedence bits are set, other QoS services such as Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED) then operate on the bit settings.

The network gives priority (or some type of expedited handling) to the marked traffic through the application of MDRR or WRED at points downstream in the network. IP precedence can be set at the edge of the network (or administrative domain) and have queueing act on it thereafter. MDRR can speed handling for high-precedence traffic at congestion points. WRED ensures that high-precedence traffic has lower loss rates than other traffic during times of congestion.

The mapping from keywords such as 0 (routine) and 1 (priority) to a precedence value is useful only in some instances. That is, the use of the precedence bit is evolving. You can define the meaning of a precedence value by enabling other features that use the value. In the case of high-end Internet QoS, IP precedences can be used to establish classes of service that do not necessarily correspond numerically to better or worse handling in the network.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example shows how to set the IP precedence to 5 (critical) for packets that match the access control list named customer1:

```
RP/0/RP0/CPU0:router(config)# class-map class1
```

```
RP/0/RP0/CPU0:router(config-cmap)# match access-group ipv4 customer1
RP/0/RP0/CPU0:router(config-cmap)# exit
```

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# set precedence 5
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
```

```
RP/0/RP0/CPU0:router(config)# interface POS 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy output policy1
```

Related Commands

Command	Description
class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

set qos-group

To set the quality of service (QoS) group identifiers on packets, use the **set qos-group** command in policy map class configuration mode. To leave the QoS group values unchanged, use the **no** form of this command.

```
set qos-group qos-group-value
no set qos-group qos-group-value
```

Syntax Description	<i>qos-group-value</i> QoS group ID. An integer from 0 to 31, to be marked on the packet.
---------------------------	---

Command Default	No group ID is specified.
------------------------	---------------------------

Command Modes	Policy map class configuration
----------------------	--------------------------------

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines	The set qos-group command associates a QoS group ID with a packet. After the QoS group ID is set, other QoS services, such as Modified Deficit Round Robin (MDRR) and Weighted Random Early Detection (WRED), can operate on the QoS group setting.
-------------------------	--

The QoS group setting is limited in scope to the local router. Typically, the QoS group is set on the local router and used in conjunction with WRED or MDRR to give differing levels of service based on the group identifier.

Task ID	Task ID	Operations
	qos	read, write

Examples

This example sets the QoS group to 5 for packets that match the MPLS experimental bit 1:

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 1
RP/0/RP0/CPU0:router(config-cmap)# exit

RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# set qos-group 5
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit

RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if)# service-policy input policy1
```

Related Commands	Command	Description
	class-map, on page 10	Defines a traffic class and the associated rules that match packets to the class.
	match dscp, on page 27	Identifies specific IP differentiated services code point (DSCP) values as match criteria for a class map.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	service-policy (interface), on page 65	Attaches a policy map to an input interface or output interface to be used as the service policy for that interface.

shape average

To shape traffic to the indicated bit rate according to the algorithm specified, use the **shape average** command in policy map class configuration mode. To remove traffic shaping, use the **no** form of this command.

shape average {**percent** *percentage* | **rate** [*units*]}

Syntax Description	
percent <i>percentage</i>	Specifies the interface bandwidth in percentage. Values can be from 1 to 100.
rate	Average shaping rate in the specified units. Values can be from 1 to 4294967295.
units	(Optional) Units for the bandwidth. Values can be: <ul style="list-style-type: none"> • Excess burst size—values can be from 1 to 4294967295 • bps—bits per second (default) • gbps—gigabits per second • kbps—kilobits per second • mbps—megabits per second

Command Default *units*: bps

Command Modes Policy map class configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines For **shape average** commands in the child policy, the reference used for percentage parameters is relative to the maximum rate of the parent. If shaping or policing is not configured on the parent, then the parent inherits the interface rate.

If you have both shape and bandwidth configured for a class, ensure that the shape percent value is always greater than the percent value for bandwidth.

Task ID	Task	Operations
	qos	read, write

Examples

This example sets traffic shaping to 50 percent of the parent shaper rate:

```
RP/0/RP0/CPU0:router (config) # policy-map policy1
RP/0/RP0/CPU0:router (config-pmap) # class class1
RP/0/RP0/CPU0:router (config-pmap-c) # shape average percent 50
```

This example shows how to set traffic shaping to 5,000,000 kbps:

```
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# shape average 5000000 kbps
```

show policy-map interface

To display policy configuration information for all classes configured for all service policies on the specified interface, use the **show policy-map interface** command in XR EXEC mode.

show policy-map interface *type interface-path-id* [{**input** | **output** }]

Syntax Description		
<i>interface type</i>		Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>		Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> • <i>rack</i>—Chassis number of the rack. • <i>slot</i>—Physical slot number of the line card. • <i>module</i>—Module number. A physical layer interface module (PLIM) is always 0. • <i>port</i>—Physical port number of the interface. For more information about the syntax for the router, use the question mark (?) online help function.
input		(Optional) Displays per class statistics on inbound traffic for the specified policy map and interface.
output		(Optional) Displays per class statistics on outbound traffic for the specified policy map and interface.

Command Default None

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Task ID	Task ID	Operations
	qos	read

Examples

This table describes the significant fields shown in the display.

Table 4: show policy-map interface Field Descriptions

Field	Description
Classification statistics	

Field	Description
Matched	Number of packets or bytes that matched this class.
Transmitted	Number of packets or bytes transmitted for this class.
Total Dropped	Number of packets or bytes dropped for this class.
Policing statistics	
Policed(conform)	Number of packets or bytes that conformed to the police rate for this class.
Policed(exceed)	Number of packets or bytes that exceeded the police rate for this class.
Policed(violate)	Number of packets or bytes that violated the police rate for this class.
Policed and dropped	Number of packets or bytes dropped by the policer of this class.
Queuing statistics	
Queue ID	Queue number of the packet in this class.
High watermark (bytes)/(ms)	Maximum length of the queue.
Inst-queue-len (bytes)/(ms)	Instantaneous length of the queue.
Avg-queue-len (bytes)/(ms)	Average length of the queue.
Taildropped (bytes)	Number of bytes taildropped for this queue.
Compression Statistics	
Sent Total	Total number of packets sent.
Sent Compressed	Number of compressed packets sent.
Sent full header	Number of packets sent with a full header.
Saved	Number of bytes saved.
Sent	Number of bytes sent.
Efficiency improvement factor	Ratio of the packet's original full size to the packet's compressed size.

show policy-map targets

To display information about the interfaces on which policy maps are applied, use the **show policy-map targets** command in XR EXEC mode.

```
show policy-map targets [{location node-id | pmap-name name | type qos [{location node-id | pmap-name name}]]
```

Syntax Description	
location <i>node-id</i>	(Optional) Displays information about the interfaces on which policy maps are applied for the specified location. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
pmap-name <i>name</i>	(Optional) Displays information about the interfaces on which the specified policy map is applied.
type qos	(Optional) Displays information about the interfaces on which QoS policy maps are applied. This is the default type.

Command Default The default QoS policy type is QoS.

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines For a short period of time while a QoS policy is being modified, no QoS policy is active on the interface. For these reasons, modify QoS policies that affect the fewest number of interfaces at a time. Use the **show policy-map targets** command to identify the number of interfaces that will be affected during policy map modification.

Task ID	Task ID	Operations
	qos	read

Examples In this example, the Gigabit Ethernet interface 0/1/0/0 has one policy map attached as a main policy. Outgoing traffic on this interface will be affected if the policy is modified:

```
RP/0/RP0/CPU0:router# show policy-map targets

Fri Jul 16 16:38:24.789 DST
1) Policymap: policy1    Type: qos
   Targets (applied as main policy):
     GigabitEthernet0/1/0/0 output
   Total targets: 1

   Targets (applied as child policy):
   Total targets: 0
```

Related Commands	Command	Description
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

show qos ea trace

To display the processing information of the QoS component on the line card, use the **show qos ea trace** command in XR EXEC mode mode.

show qos ea trace [**all**] [**file** *name* **original location** *node-id*] [**hexdump**] [**last** *entries*] [**location** *node-id*] [**tailf**] [**misc**] [**reverse**] [**stats**] [**unique**] [**verbose**] [**wrapping**] [**internal**] [**external**] [**errors**] [**qfifo**] [**wide**]

Syntax Description		
	all	(Optional) Specifies all trace entries.
	file <i>name</i> original location <i>node-id</i>	(Optional) Specifies the original location of a file.
	hexdump	(Optional) Displays trace entries in hexadecimal format.
	last <i>entries</i>	(Optional) Displays a specified number of the most recent trace entries.
	location <i>node-id</i>	(Optional) Displays trace entries associated with a designated node. The <i>node-id</i> argument is entered in the <i>rack/slot/module</i> notation.
	tailf	(Optional) Displays new trace entries as they are added.
	misc	(Optional) Displays miscellaneous trace entries.
	reverse	(Optional) Displays the most recent trace entries first.
	stats	(Optional) Displays trace entry statistics.
	unique	(Optional) Displays unique trace entries with counts.
	verbose	(Optional) Displays internal trace entry debugging information.
	wrapping	(Optional) Displays wrapping trace entries.
	internal	(Optional) Displays internal trace entries.
	external	(Optional) Displays external events received.
	errors	(Optional) Displays error traces.
	qfifo	(Optional) Displays QFIFO component interface events.
	wide	(Optional) Displays buffer name, node name, tid.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History	Release	Modification
	Release 3.6.0	This command was introduced.

Release	Modification
Release 3.8.0	The qfifo keyword was added.
Release 5.0.0	This command was introduced.

Usage Guidelines

If you do not enter a *node-id* value, all configured interfaces are displayed.

Task ID

Task ID	Operations
qos	read

Examples

This example shows how to display QoS trace entry information:

```
RP/0/RP0/CPU0:router# show qos ea trace
```

This table describes the significant fields shown in the display.

Table 5: show qos ea-trace Field Descriptions

Field	Description
Timestamp	Time when the trace message is captured.
Process Name	Name of the process responsible for the trace.
Location	Card or slot which executes the process.
Message	Trace message.

show qos interface

To display QoS information for a specific interface, use the **show qos interface** command in the XR EXEC mode.

show qos interface *type interface-path-id* {**input**|**output**} {**member** *type interface-path-id*}[**host-link** *interface-path-id*| **location** *node-id*]

Syntax Description

<i>type</i>	Interface type. For more information, use the question mark (?) online help function.
<i>interface-path-id</i>	<p>Either a physical interface instance or a virtual interface instance as follows:</p> <ul style="list-style-type: none"> Physical interface instance. Naming notation is <i>rack/slot/module/port</i> and a slash between values is required as part of the notation. <ul style="list-style-type: none"> <i>rack</i> : Chassis number of the rack. <i>slot</i> : Physical slot number of the modular services card or line card. <i>module</i> : Module number. A physical layer interface module (PLIM) is always 0. <i>port</i> : Physical port number of the interface. <p>Note In references to a Management Ethernet interface located on a route processor card, the physical slot number is alphanumeric (RP0 or RP1) and the module is CPU0. Example: interface MgmtEth0/ RP1 /CPU0/0.</p> <ul style="list-style-type: none"> Virtual interface instance. Number range varies depending on interface type. <p>For more information about the syntax for the router, use the question mark (?) online help function.</p>
input	Attaches the specified policy map to the input interface.
output	Attaches the specified policy map to the output interface.
member	<p>Specifies member of bundle interface or pin-down (generic list) interface of PWHE interface.</p> <p>Note This keyword is applicable only for bundle and PWHE interface.</p>

host-link	(Optional) Specifies the host-link. Note This keyword is applicable only for satellite information.
location <i>node-id</i>	(Optional) Displays detailed QoS information for the designated node. The <i>node-id</i> argument is entered in the rack/slot/module notation.

Command Default No default behavior or values

Command Modes XR EXEC mode

Command History	Release	Modification
	Release 5.0.0	This command was introduced.
	Release 5.1.1	The show qos interface command output was updated to display Flow Aware call admission control (CAC) and user based rate limiting (UBRL) information. The show qos interface command output was updated to display QoS Offload on satellite information. PWHE interface type PW-Ether and PW-IW were added. The show output was updated for PWHE interface details.

Usage Guidelines The **show qos interface** command displays configuration for all classes in the service policy that is attached to an interface.

Use this command to check the actual values programmed in the hardware from the action keywords in the **police rate** command.

(Only BNG) To enter the dynamic template configuration mode, run **dynamic-template** command in the XR Config mode.

Task ID	Task ID	Operations
	qos	read

Examples

This example shows the QoS information on bundle-ether interface:

```
RP/0/RP0/CPU0:router# show qos interface bundle-ether 1 output
Tue Jul  2 18:00:21.522 UTC
NOTE:- Configured values are displayed within parentheses
Node 0/4/CPU0, Interface Bundle-Ether1 Ifh 0x800001c (BundleMain) -- output policy
NPU Id:                0
Total number of classes:          9
Interface Bandwidth:           20000000 kbps
Accounting Type:              Layer2 (Include Layer 2 encapsulation and above)
-----
Level1 Class                =   prec-1
```

show qos interface

```

Bundle Qtable Resource handle      = 0x7000a00b45906
Policer not configured for this class

Level1 Class                        = prec-2
Bundle Qtable Resource handle      = 0x7000a00be5906

Policer Bucket Id                  = 0x90001000a5103
Policer committed rate              = 199936 kbps (1 %)
Policer conform burst               = 249856 bytes (default)
Policer conform action              = Just TX
Policer exceed action               = DROP PKT

Level1 Class                        = prec-3
Bundle Qtable Resource handle      = 0x7000a00c85906
Policer not configured for this class

Level1 Class                        = prec-5
Bundle Qtable Resource handle      = 0x7000a00d25906
Policer not configured for this class

Level1 Class                        = prec-6
Bundle Qtable Resource handle      = 0x7000a00dc5906

Policer Bucket Id                  = 0x90001000b5103
Policer committed rate              = 199936 kbps (1 %)
Policer conform burst               = 249856 bytes (default)
Policer conform action              = Just TX
Policer exceed action               = DROP PKT

Level1 Class                        = prec-7
Bundle Qtable Resource handle      = 0x7000a00e65906

Policer Bucket Id                  = 0x90001000c5103
Policer committed rate              = 199936 kbps (1 %)
Policer conform burst               = 249856 bytes (default)
Policer conform action              = Just TX
Policer exceed action               = DROP PKT

Level1 Class                        = prec-0
Bundle Qtable Resource handle      = 0x7000a00f05906

Policer Bucket Id                  = 0x90001000d5103
Policer committed rate              = 199936 kbps (1 %)
Policer conform burst               = 2490368 bytes (default)
Policer conform action              = Just TX
Policer exceed action               = DROP PKT

Level1 Class                        = qq-511
Bundle Qtable Resource handle      = 0x7000a00fa5906

Policer Bucket Id                  = 0x90001000e5103
Policer committed rate              = 199936 kbps (1 %)
Policer peak rate                   = 399872 kbps (2 %)
Policer conform burst               = 249856 bytes (default)
Policer exceed burst                = 499712 bytes (default)
Policer conform action              = Just TX
Policer exceed action               = Just TX
Policer violate action              = DROP PKT

Level1 Class                        = class-default
Bundle Qtable Resource handle      = 0x7000a01045906
Policer not configured for this class

Interface TenGigE0/4/0/0/4 Ifh 0x2000030 (Member) -- output policy

```

```

NPU Id:          0
Total number of classes:      9
Interface Bandwidth:         10000000 kbps
Accounting Type:             Layer2 (Include Layer 2 encapsulation and above)
-----

```

```

Levell Class          = prec-1
Schedule entry ID     = 0x2a (0x6c001)
Egressq Queue ID     = 42 (LP queue)
Queue Max. BW.       = 100000 kbps (1 %)
Queue Min. BW.       = 0 kbps (default)
Weight                = 25 (BWR not configured)
Guaranteed service rate = 100000 kbps
TailDrop Threshold    = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

```

```

Levell Class (HP2)    = prec-2
Schedule entry ID     = 0x2b (0x6c002)
Egressq Queue ID     = 43 (HP2 queue)
Guaranteed service rate = 10000000 kbps
TailDrop Threshold    = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

```

```

Levell Class          = prec-3
Schedule entry ID     = 0x2e (0x6c003)
Egressq Queue ID     = 46 (LP queue)
Queue Max. BW.       = no max (default)
Queue Min. BW.       = 100000 kbps (1 %)
Weight                = 25 (BWR not configured)
Guaranteed service rate = 2426772 kbps
TailDrop Threshold    = 333681 bytes / 1 ms (1100 us)
Policer not configured for this class
WRED not configured for this class

```

```

Levell Class          = prec-5
Schedule entry ID     = 0x2f (0x6c004)
Eg Queue ID          = 0x37 (0x6c009)
Egressq Queue ID     = 55 (Default LP queue)
Queue Max. BW.       = 100000 kbps (1 %)
Queue Min. BW.       = 0 kbps (default)
Weight                = 25 (BWR not configured)
Guaranteed service rate = 100000 kbps
TailDrop Threshold    = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

```

```

Interface TenGigE0/4/0/0/5 Ifh 0x2000038 (Member) -- output policy
NPU Id:          0
Total number of classes:      9
Interface Bandwidth:         10000000 kbps
Accounting Type:             Layer2 (Include Layer 2 encapsulation and above)
-----

```

```

Levell Class          = prec-1
Schedule entry ID     = 0x3a (0x6c001)
Egressq Queue ID     = 58 (LP queue)
Queue Max. BW.       = 100000 kbps (1 %)
Queue Min. BW.       = 0 kbps (default)
Weight                = 25 (BWR not configured)
Guaranteed service rate = 100000 kbps
TailDrop Threshold    = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

```

show qos interface

```

Level1 Class (HP2) = prec-2
Schedule entry ID = 0x3b (0x6c002)
Egressq Queue ID = 59 (HP2 queue)
Guaranteed service rate = 10000000 kbps
TailDrop Threshold = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class = prec-3
Schedule entry ID = 0x3e (0x6c003)
Egressq Queue ID = 62 (LP queue)
Queue Max. BW. = no max (default)
Queue Min. BW. = 100000 kbps (1 %)
Weight = 25 (BWR not configured)
Guaranteed service rate = 2426772 kbps
TailDrop Threshold = 333681 bytes / 1 ms (1100 us)
Policer not configured for this class
WRED not configured for this class

Level1 Class = prec-5
Schedule entry ID = 0x3f (0x6c004)
Egressq Queue ID = 63 (LP queue)
Queue Max. BW. = 100000 kbps (1 %)
Queue Min. BW. Egressq Queue ID = 66 (HP1 queue)
Guaranteed service rate = 10000000 kbps
TailDrop Threshold = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP1) = prec-7
Schedule entry ID = 0x43 (0x6c006)
Egressq Queue ID = 67 (HP1 queue)
Guaranteed service rate = 10000000 kbps
TailDrop Threshold = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class = prec-0
Egressq Queue ID = 71 (Default LP queue)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP1) = qq-511
Schedule entry ID = 0x46 (0x6c008)
Egressq Queue ID = 70 (HP1 queue)
Guaranteed service rate = 10000000 kbps
TailDrop Threshold = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class = class-default
Schedule entry ID = 0x47 (0x6c009)
Egressq Queue ID = 71 (Default LP queue)
Queue Max. BW. = 100000 kbps (1 %)
Queue Min. BW. = 0 kbps (default)
Weight = 25 (BWR not configured)
Guaranteed service rate = 100000 kbps
TailDrop Threshold = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Node 0/4/CPU0, Interface Bundle-Ether1 Ifh 0x800001c (BundleMain) -- output policy
NPU Id: 2
Total number of classes: 9

```

```

Interface Bandwidth:          20000000 kbps
Accounting Type:             Layer2 (Include Layer 2 encapsulation and above)
-----
Levell Class                  = prec-1
Bundle Qtable Resource handle = 0x7000a00b45926
Policer not configured for this class

Levell Class                  = prec-2
Bundle Qtable Resource handle = 0x7000a00be5926

Policer Bucket Id            = 0x90001000a5123
Policer committed rate       = 199936 kbps (1 %)
Policer conform burst        = 249856 bytes (default)
Policer conform action       = Just TX
Policer exceed action        = DROP PKT

Levell Class                  = prec-3
Bundle Qtable Resource handle = 0x7000a00c85926
Policer not configured for this class

Levell Class                  = prec-5
Bundle Qtable Resource handle = 0x7000a00d25926
Policer not configured for this class

Levell ClPolicer committed rate = 199936 kbps (1 %)
Policer conform burst        = 249856 bytes (default)
Policer conform action       = Just TX
Policer exceed action        = DROP PKT

Levell Class                  = prec-7
Bundle Qtable Resource handle = 0x7000a00e65926

Policer Bucket Id            = 0x90001000c5123
Policer committed rate       = 199936 kbps (1 %)
Policer conform burst        = 249856 bytes (default)
Policer conform action       = Just TX
Policer exceed action        = DROP PKT

Levell Class                  = prec-0
Bundle Qtable Resource handle = 0x7000a00f05926

Policer Bucket Id            = 0x90001000d5123
Policer committed rate       = 199936 kbps (1 %)
Policer conform burst        = 2490368 bytes (default)
Policer conform action       = Just TX
Policer exceed action        = DROP PKT

Levell Class                  = qg-511
Bundle Qtable Resource handle = 0x7000a00fa5926

Policer Bucket Id            = 0x90001000e5123
Policer committed rate       = 199936 kbps (1 %)
Policer peak rate            = 399872 kbps (2 %)
Policer conform burst        = 249856 bytes (default)
Policer exceed burst        = 499712 bytes (default)
Policer conform action       = Just TX
Policer exceed action        = Just TX
Policer violate action       = DROP PKT

Levell Class                  = class-default
Bundle Qtable Resource handle = 0x7000a01045926
Policer not configured for this class

Interface TenGigE0/4/0/4/4 Ifh 0x20000d0 (Member) -- output policy

```

show qos interface

```

NPU Id:          2
Total number of classes:      bbps (1 %)
Queue Min. BW.                = 0 kbps (default)
Weight                        = 25 (BWR not configured)
Guaranteed service rate       = 100000 kbps
TailDrop Threshold            = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP1)            = prec-6
Schedule entry ID             = 0x32 (0x2c005)
Egressq Queue ID              = 50 (HP1 queue)
Guaranteed service rate       = 10000000 kbps
TailDrop Threshold            = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP1)            = prec-7
Schedule entry ID             = 0x33 (0x2c006)
Egressq Queue ID              = 51 (HP1 queue)
Guaranteed service rate       = 10000000 kbps
TailDrop Threshold            = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class                   = prec-0
Egressq Queue ID              = 55 (Default LP queue)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP1)            = qg-511
Schedule entry ID             = 0x36 (0x2c008)
Egressq Queue ID              = 54 (HP1 queue)
Guaranteed service rate       = 10000000 kbps
TailDrop Threshold            = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class                   = class-default
Schedule entry ID             = 0x37 (0x2c009)
Egressq Queue ID              = 55 (Default LP queue)
Queue Max. BW.                = 100000 kbps (1 %)
Queue Min. BW.                = 0 kbps (default)
Weight                        = 25 (BWR not configured)
Guaranteed service rate       = 100000 kbps
TailDrop Threshold            = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Interface TenGigE0/4/0/4/5 Ifh 0x20000d8 (Member) -- output policy
NPU Id:          2
Total number of classes:      9
Interface Bandwidth:          10000000 kbps
Accounting Type:              Layer2 (Include Layer 2 encapsulation and above)
-----
Level1 Class                   = prec-1
Schedule entry ID             = 0x3a (0x2c001)
Egressq Queue ID              = 58 (LP queue)
Queue Max. BW.                = 100000 kbps (1 %)
Queue Min. BW.                = 0 kbps (default)
Weight                        = 25 (BWR not configured)
Guaranteed service rate       = 100000 kbps
TailDrop Threshold            = 1250000 bytes / 100 ms (default)
Policer not configured for this class

```

```

WRED not configured for this class

Levell Class (HP2)                = prec-2
Schedule entry ID                  = 0x3b (0x2c002)
Egressq Queue ID                   = 59 (HP2 queue)
Guaranteed service rate            = 10000000 kbps
TailDrop Threshold                 = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Levell Class                       = prec-3
Schedule entry ID                   = 0x3e (0xicer not configured for this = prec-3
Bundle Qtable Resource handle      = 0x7000a00c85906
Policer not configured for this class

Levust TX
Policer vault)
Policer conform action              = Just TX
Policer exceed action               = Just TX
Policer violate action              = DROP PKT

Levell Class                       = class-default
Bundle Qtable Resource handle      = 0x7000a01045906
Policer not configured for this class

Interface TenGigE0/6/0/0/3 Ifh 0x3000028 (Member) -- output policy
NPU Id:                             0
Total number of classes:             9
Interface Bandwidth:                 10000000 kbps
Interface State:                     DOWN
Accounting Type:                     Layer2 (Include Layer 2 encapsulation and above)
-----
Levell Class                       = prec-1
Schedule entry ID                   = 0x1a (0x1ba001)
Egressq Queue ID                   = 26 (LP queue)
Queue Max. BW.                     = 100000 kbps (1 %)
Queue Min. BW.                     = 0 kbps (default)
Weight                              = 25 (BWR not configured)
Guaranteed service rate             = 100000 kbps
TailDrop Threshold                 = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Levell Class (HP2)                 = prec-2
Schedule entry ID                   = 0x1b (0x1ba002)
Egressq Queue ID                   = 27 (HP2 queue)
Guaranteed service rate            = 10000000 kbps
TailDrop Threshold                 = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Levell Class                       = prec-3
Schedule entry ID                   = 0x1e (0x1ba003)
Egressq Queue ID                   = 30 (LP queue)
Queue Max. BW.                     = no = qg-511
Schedule entry ID                   = 0x26 (0x1ba008)
Egressq Queue ID                   = 38 (HP1 queue)
Guaranteed service rate            = 10000000 kbps
TailDrop Threshold                 = 12500000 bytes / 10 ms (default)
Policer not configured for this class
WRED not configured for this class

Levell Class                       = class-default

```

show qos interface

```

Schedule entry ID                = 0x27 (0x1ba009)
Egressq Queue ID                 = 39 (Default LP queue)
Queue Max. BW.                   = 100000 kbps (1 %)
Queue Min. BW.                   = 0 kbps (default)
Weight                            = 25 (BWR not configured)
Guaranteed service rate           = 100000 kbps
TailDrop Threshold                = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Interface TenGigE0/6/0/0/4 Ifh 0x3000030 (Member) -- output policy
NPU Id:                           0
Total number of classes:           9
Interface Bandwidth:               10000000 kbps
Interface State:                   DOWN
Accounting Type:                   Layer2 (Include Layer 2 encapsulation and above)
-----
Level1 Class                       = prec-1
Schedule entry ID                  = 0x2a (0x1ba001)
Egressq Queue ID                   = 42 (LP queue)
Queue Max. BW.                     = 100000 kbps (1 %)
Queue Min. BW.                     = 0 kbps (default)
Weight                              = 25 (BWR not configured)
Guaranteed service rate             = 100000 kbps
TailDrop Threshold                  = 1250000 bytes / 100 ms (default)
Policer not configured for this class
WRED not configured for this class

Level1 Class (HP2)                 = prec-2
Schedule entry ID                  = 0x2b (0x1ba002)
Egressq Queue eed service rate     = 51 (HP1 queue)
Guaranteed service rate             =
$

```

```

RP/0/RP0/CPU0:router# show policy-map interface bundle-e 1 out
Tue Jul  2 18:00:37.000 UTC

```

```

Bundle-Ether1 output: egress-8q-be

```

```

Class prec-1
  Classification statistics          (packets/bytes)    (rate - kbps)
  Matched                          :                   0/0                0
  Transmitted                       :                   0/0                0
  Total Dropped                     :                   0/0                0
  Queueing statistics
  Queue ID                          : None (Bundle)
  High watermark (bytes)/(ms)       : 0/0
  Taildropped(packets/bytes)        : 0/0
Class prec-2
  Classification statistics          (packets/bytes)    (rate - kbps)
  Matched                          : 840111672/836751225312    1010924
  Transmitted                       : 337321907/335972619372    405868
  Total Dropped                     : 502789765/500778605940    605056
  Policing statistics
  Policed(conform)                  : 337321899/335972611404    405840
  Policed(exceed)                   : 502789765/500778605940    605056
  Policed(violate)                  :                   0/0                0
  Policed and dropped               : 502789765/500778605940
  Queueing statistics
  Queue ID                          : None (Bundle)
  High watermark (bytes)/(ms)       : 0/0
  Taildropped(packets/bytes)        : 0/0
Class prec-3

```

```

Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 600080292/837712087632    1011924
Transmitted                      : 600080292/837712087632    1011924
Total Dropped                   : 0/0                      0
Queueing statistics
Queue ID                         : None (Bundle)
High watermark (bytes)/(ms)     : 0/0
Taildropped(packets/bytes)      : 0/0
Class prec-5
Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 600078251/837709238396    1012733
Transmitted                      : 240747447/336083436012    405999
Total Dropped                   : 359330804/501625802384    606734
Queueing statistics
Queue ID                         : None (Bundle)
High watermark (bytes)/(ms)     : 1250816/100
Taildropped(packets/bytes)      : 359330804/501625802384
Class prec-6
Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 600082328/837710011902    1012685
Transmitted                      : 240668758/335968770746    405868
Total Dropped                   : 359413570/501741241156    606817
Policing statistics              (packets/bytes)    (rate - kbps)
Policed(conform)                : 240664818/335968039308    405841
Policed(exceed)                 : 359413570/501741241156    606817
Policed(violate)                : 0/0                      0
Policed and dropped             : 359413570/501741241156
Queueing statistics
Queue ID                         : None (Bundle)
High watermark (bytes)/(ms)     : 0/0
Taildropped(packets/bytes)      : 0/0
Class prec-7
Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 600079831/837711444076    1012077
Transmitted                      : 240668181/335972780676    405869
Total Dropped                   : 359411650/501738663400    606208
Policing statistics              (packets/bytes)    (rate - kbps)
Policed(conform)                : 240668175/335972772300    405840
Policed(exceed)                 : 359411650/501738663400    606208
Policed(violate)                : 0/0                      0
Policed and dropped             : 359411650/501738663400
Queueing statistics
Queue ID                         : None (Bundle)
High watermark (bytes)/(ms)     : 0/0
Taildropped(packets/bytes)      : 0/0
Class prec-0
Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 600080675/837712146002    1011838
Transmitted                      : 66128842/92315717058     111657
Total Dropped                   : 533951833/745396428944    900181
Policing statistics              (packets/bytes)    (rate - kbps)
Policed(conform)                : 240672694/335978933000    405839
Policed(exceed)                 : 359407900/501733201496    605987
Policed(violate)                : 0/0                      0
Policed and dropped             : 359407900/501733201496
Queueing statistics
Queue ID                         : None (Bundle)
Taildropped(packets/bytes)      : 174543933/243663227448
Class qg-511
Classification statistics          (packets/bytes)    (rate - kbps)
Matched                          : 0/0                      0
Transmitted                      : 0/0                      0
Total Dropped                   : 0/0                      0
Policing statistics              (packets/bytes)    (rate - kbps)

```

show qos interface

```

    Policed(conform)      :           0/0           0
    Policed(exceed)      :           0/0           0
    Policed(violate)     :           0/0           0
    Policed and dropped  :           0/0
Queueing statistics
  Queue ID                : None (Bundle)
  High watermark (bytes)/(ms) : 0/0
  Taildropped(packets/bytes) : 0/0
Class class-default
  Classification statistics      (packets/bytes)      (rate - kbps)
  Matched                       : 599630066/837083501366      1010558
  Transmitted                   : 174674878/243846058918      294329
  Total Dropped                 : 424955188/593237442448      716229
Queueing statistics
  Queue ID

```

This is the sample output of the **show qos interface** command for CAC:

```

RP/0/RP0/CPU0:router# show qos interface gigabitEthernet 0/1/0/0 input

Interface: GigabitEthernet0_1_0_0 input
Bandwidth configured: 1000000 kbps Bandwidth programed: 1000000 kbps
ANCP user configured: 0 kbps ANCP programed in HW: 0 kbps
Port Shaper programed in HW: 0 kbps
Policy: premium_services (Flow Aware Policy) Total number of classes: 5
-----
Level: 0 Policy: premium_services Class: dscp_cs5
QueueID: 98 (Port Default)
Policer Profile: 56 (Single)
Conform: 100000 kbps (100 mbps) Burst: 1250000 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 0 Policy: premium_services Class: dscp_cs6
Flow QoS Info: CAC Cac Action
CAC Flow Mask Mode: 5-Tuple (0x20)
CAC Flow Rate: 128 kbps
CAC Rate: 896 kbps
CAC Max Flow Count: 7
CAC Flow Age: 20 Seconds
QueueID: N/A
-----
Level: 1 Policy: video_flows Class: video_admitted
Flow QoS Info: CAC Admit Class
CAC Flow Mask Mode: 5-Tuple (0x20)
CAC Max Flow Count: 7
CAC Flow Age: 20 Seconds
CAC Reject Action: Redirect
Number of CAC flows admitted: 0Parent Policy: premium_services Class: dscp_cs6
QueueID: 98 (Port Default)
Child Mark: set disc 1
-----
Level: 1 Policy: video_flows Class: class-default
Flow QoS Info: CAC Redirect Class
Parent Policy: premium_services Class: dscp_cs6
QueueID: 98 (Port Default)
Child Mark: set dscp 32
-----
Level: 0 Policy: premium_services Class: class-default
QueueID: 98 (Port Default)
Policer Profile: 54 (Single)
Conform: 30000 kbps (30 mbps) Burst: 375000 bytes (0 Default)

```

```
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
```

This is the sample output of the **show qos interface** command for UBRL:

```
RP/0/RP0/CPU0:router# show qos interface gigabitEthernet 0/1/0/0 input

Interface: GigabitEthernet0_1_0_0 input
Bandwidth configured: 1000000 kbps Bandwidth programed: 1000000 kbps
ANCP user configured: 0 kbps ANCP programed in HW: 0 kbps
Port Shaper programed in HW: 0 kbps
Policy: voice_flow (Flow Aware Policy) Total number of classes: 3
-----
Level: 0 Policy: voice_flow Class: voice_prec6
QueueID: 98 (Port Default)
Policer Profile: 56 (Single)
Conform: 5000 kbps (5 mbps) Burst: 62500 bytes (0 Default)
Child Policer Conform: set dscp 34
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 0 Policy: voice_flow Class: ubrl1
Flow QoS Info: UBRL
UBRL Flow Mask Mode: src-ip (0x80)
UBRL Flow Age: 200 Seconds
Number of UBRL flows learnt: 0
QueueID: 98 (Port Default)
Flow Policer Profile: 58 (Single)
Conform: 10000 kbps (10 mbps) Burst: 125000 bytes (0 Default)
Catch-all Policer Profile: 57 (Single)
Conform: 100000000 kbps (100000000 kbps) Burst: 12500000 bytes (12500000 bytes)
Child Policer Conform: set dscp 34
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 0 Policy: voice_flow Class: class-default
QueueID: 98 (Port Default)
Policer Profile: 54 (Single)
Conform: 30000 kbps (30 mbps) Burst: 375000 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
```

This is the sample output of the **show qos interface** command for PW-HE subinterfaces.

```
RP/0/RP0/CPU0:router# show qos interface pw-ether1.1 input member tengige0/2/0/5

Interface: TenGigE0_2_0_5 input
Bandwidth configured: 10000000 kbps Bandwidth programed: 10000000 kbps
ANCP user configured: 0 kbps ANCP programed in HW: 0 kbps
Port Shaper programed in HW: 0 kbps
Policy: PW-HE-Ingress Total number of classes: 9
-----
Level: 0 Policy: PW-HE-Ingress Class: class-default
QueueID: N/A
Policer Profile: 55 (Single)
Conform: 2000000 kbps (2 gbps) Burst: 25000000 bytes (0 Default)
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: 3play-voip
Parent Policy: PW-HE-Ingress Class: class-default
```

show qos interface

```

QueueID: 160 (Port Priority 1)
Policer Profile: 56 (Single)
Conform: 20000 kbps (1 percent) Burst: 125000 bytes (50 ms)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: multicast_limit
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 161 (Port Priority 2)
Policer Profile: 57 (SrTCM)
Conform: 40000 kbps (2 percent) Burst: 128000 bytes (128000 bytes)
Peak Burst: 128000 bytes (256000 bytes)
Child Policer Conform: set prec 5
Child Policer Exceed: set prec 4
Child Policer Violate: set prec 4
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: dscp_EF_ipprec_5
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 162 (Port Default)
Policer Profile: 58 (Single)
Conform: 100000 kbps (5 percent) Burst: 256000 bytes (256000 bytes)
Child Policer Conform: set exp-imp 5
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: dscp_AF4x_ipprec_4
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 162 (Port Default)
Policer Profile: 59 (Single)
Conform: 200000 kbps (10 percent) Burst: 2500000 bytes (100 ms)
Child Policer Conform: set exp-imp 4
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: dscp_AF3x_ipprec_3_6_7
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 162 (Port Default)
Policer Profile: 60 (Single)
Conform: 400000 kbps (20 percent) Burst: 5000000 bytes (0 Default)
Child Policer Conform: set exp-imp 3
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: dscp_AF2x_ipprec_2
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 162 (Port Default)
Policer Profile: 61 (Single)
Conform: 440000 kbps (22 percent) Burst: 5500000 bytes (0 Default)
Child Policer Conform: set exp-imp 2
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: ip_best_effort_BE
Parent Policy: PW-HE-Ingress Class: class-default
QueueID: 162 (Port Default)
Policer Profile: 62 (Single)
Conform: 300000 kbps (15 percent) Burst: 3750000 bytes (0 Default)
Child Policer Conform: set exp-imp 0
Child Policer Exceed: DROP
Child Policer Violate: DROP
-----
Level: 1 Policy: DSCP_CE-PE_ETM Class: class-default
Parent Policy: PW-HE-Ingress Class: class-default

```

```
QueueID: 162 (Port Default)
Policer Profile: 63 (Single)
Conform: 500000 kbps (25 percent) Burst: 6250000 bytes (0 Default)
Child Policer Conform: TX
Child Policer Exceed: DROP
Child Policer Violate: DROP
```

switch-fabric service-policy

To configure a service policy for the switch fabric, use the **switch-fabric service-policy** command in XR Config mode. To remove a specified service policy from the switch fabric, use the **no** form of this command.

switch-fabric service-policy *policy-map-name*
no switch-fabric service-policy *policy-map-name*

Syntax Description	<i>policy-map-name</i> Name of the predefined policy map to be used as a QoS policy. The name can be a maximum of 40 alphanumeric characters.						
Command Default	No service policy is specified.						
Command Modes	XR Config mode						
Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>Release 5.0.0</td> <td>This command was introduced.</td> </tr> <tr> <td>Release 6.6.1</td> <td>Support for a fourth class was enabled. This allows for Assured Forwarding (AF) and Best Effort (BE) traffic to be supported, even while prioritizing allocation for (High Priority) HP traffic.</td> </tr> </tbody> </table>	Release	Modification	Release 5.0.0	This command was introduced.	Release 6.6.1	Support for a fourth class was enabled. This allows for Assured Forwarding (AF) and Best Effort (BE) traffic to be supported, even while prioritizing allocation for (High Priority) HP traffic.
Release	Modification						
Release 5.0.0	This command was introduced.						
Release 6.6.1	Support for a fourth class was enabled. This allows for Assured Forwarding (AF) and Best Effort (BE) traffic to be supported, even while prioritizing allocation for (High Priority) HP traffic.						
Usage Guidelines	No specific guidelines impact the use of this command.						
Task ID	<table border="1"> <thead> <tr> <th>Task ID</th> <th>Operations</th> </tr> </thead> <tbody> <tr> <td>qos</td> <td>read, write</td> </tr> </tbody> </table>	Task ID	Operations	qos	read, write		
Task ID	Operations						
qos	read, write						
Examples	<p>This example configures the service policy for policy map fabqos.</p> <pre>RP/0/RP0/CPU0:router(config)# class-map match-any AF RP/0/RP0/CPU0:router(config-cmap)# match qos-group 4-9 17-22 RP/0/RP0/CPU0:router(config-cmap)# end-class-map RP/0/RP0/CPU0:router(config)# class-map match-any HP1 RP/0/RP0/CPU0:router(config-cmap)# match qos-group 13 26 RP/0/RP0/CPU0:router(config-cmap)# end-class-map RP/0/RP0/CPU0:router(config)# policy-map fabqos RP/0/RP0/CPU0:router(config)# class HP1 RP/0/RP0/CPU0:router(config)# priority level 1 RP/0/RP0/CPU0:router(config)# class HP2 RP/0/RP0/CPU0:router(config)# priority level 2 RP/0/RP0/CPU0:router(config)# class AF RP/0/RP0/CPU0:router(config)# bandwidth remaining percent 50 RP/0/RP0/CPU0:router(config-cmap)# end-policy-map RP/0/RP0/CPU0:router(config)# switch-fabric RP/0/RP0/CPU0:router(config)# service-policy fabqos</pre>						

```
RP/0/RP0/CPU0:router(config)# configure  
RP/0/RP0/CPU0:router(config)# switch-fabric service-policy map fabqos
```

violate-action

To configure the action to take on packets that violate the rate limit, use the **violate-action** command in policy map police configuration mode. To remove a conform action from the policy-map, use the **no** form of this command.

```
violate-action {drop | set options | transmit}
no violate-action {drop | set options | transmit}
```

Syntax Description	
drop	Drops the packet.
transmit	Transmits the packets.

Command Default No default behavior or values

Command Modes Policy map police configuration

Command History	Release	Modification
	Release 5.0.0	This command was introduced.

Usage Guidelines For more information regarding the traffic policing feature refer to the [police rate, on page 43](#) command. The **violate-action** command can set the DSCP, the precedence, or the discard class for IP packets, and experimental and discard-class values for MPLS packets.

Task ID	Task ID	Operations
	qos	read, write

Examples

In this example for MPLS, traffic policing is configured to drop packets that violate the rate limit:

```
RP/0/RP0/CPU0:router(config)# class-map class1
RP/0/RP0/CPU0:router(config-cmap)# match mpls experimental topmost 0
RP/0/RP0/CPU0:router(config-cmap)# exit
RP/0/RP0/CPU0:router(config)# policy-map policy1
RP/0/RP0/CPU0:router(config-pmap)# class class1
RP/0/RP0/CPU0:router(config-pmap-c)# police rate 250 kbps burst 50
RP/0/RP0/CPU0:router(config-pmap-c-police)# violate-action drop
RP/0/RP0/CPU0:router(config-pmap-c-police)# exit
RP/0/RP0/CPU0:router(config-pmap-c)# exit
RP/0/RP0/CPU0:router(config-pmap)# exit
RP/0/RP0/CPU0:router(config)# interface HundredGigE 0/1/0/0
RP/0/RP0/CPU0:router(config-if) service-policy input policy1
```

Related Commands	Command	Description
	conform-action, on page 13	Configures the action to take on packets that conform to the rate limit.
	exceed-action, on page 17	Configures the action to take on packets that exceed the rate limit.
	police rate, on page 43	Configures traffic policing and enters policy map police configuration mode.
	policy-map, on page 46	Creates or modifies a policy map that can be attached to one or more interfaces to specify a service policy.
	show policy-map interface, on page 84	Displays policy configuration information for all classes configured for all service policies on the specified interface.

violate-action